California High-Speed Rail Authority

RFP No.: HSR 14-32

Request for Proposals for Design-Build Services for Construction Package 4

Reference Material, Part C.4 Geotechnical Data Report (GDR)

Note:

1. **Southern limit of CP4 ends just north of Poplar Ave, at approximately station WS1 5880+00, even though this document shows the limit just north of 7th Standard Road. Work south of the contract limit of WS1 5880+00 should not be considered as part of the contract.**

2. **Piezometer Memo report update appended to the end of the document as attachment.**

CALIFORNIA HIGH-SPEED TRAIN

Engineering Report

Preliminary Engineering for Procurement

Record Set Submission
Fresno to Bakersfield
Sierra Subdivision
Construction Package 4
Geotechnical Data Report

May 2014

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015



CALIFORNIA
High-Speed Rail Authority

Preliminary Engineering for Procurement
Record Set Submission
Fresno to Bakersfield
Sierra Subdivision
Construction Package 4
Geotechnical Data Report

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Prepared by:

URS/HMM/Arup Joint Venture

May 2014

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Appendix D PS Logging Records — GEOVision Geophysical Services
Appendix E Laboratory Test Records — Sierra Testing Laboratories, Inc.

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List of Abbreviations

ASTM	ASTM International (formerly American Society for Testing and Materials)
Authority	California High-Speed Rail Authority
bgs	below ground surface
Caltrans	California Department of Transportation
CBR	California Bearing Ratio
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CHSTP	California High-Speed Train Project
CP	Construction Package
CPT	cone penetration test
EL	elevation
EPA	US Environmental Protection Agency
FB	Fresno to Bakersfield
GBR-B	Geotechnical Baseline Report for Bid
GDR	Geotechnical Data Report
GI	ground investigation
GSHR	Geologic and Seismic Hazards Report
HMM	Hatch Mott MacDonald
HSR	high-speed rail
IBC	International Building Code
ICC	International Code Council
JPL	Jet Propulsion Laboratory
MCE	Maximum Considered Earthquake
MSL	above mean sea level
NAD83	1983 North American Datum
NAVD88	1988 North American Vertical Datum
NEHRP	National Earthquake Hazards Reduction Program
NTD	Notice to Designers
OBE	Operating Basis Earthquake
PE4P	preliminary engineering for procurement
PPDT	pore pressure dissipation test
ppm	parts per million
PS logging	P- and S-wave suspension velocity logging
RC	Regional Consultant (the URS/HMM/Arup Joint Venture and subconsultants)
R-value	resistance value
SBT	CPT soil behavior type
SBT_N	normalized CPT soil behavior type
SCPT	seismic cone penetration test
SJV	San Joaquin Valley
SM	*Standard Methods for the Examination of Water and Wastewater*
SPT	standard penetration test
SR	State Route
TM	Technical Memorandum
TXCD	triaxial unconsolidated undrained
TXUU	triaxial consolidated drained
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USGS	United States Geological Survey
V_{s30}	average shear wave velocity in the upper 30 meters of soil

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Executive Summary

The California High-Speed Train Project (CHSTP) will provide intercity high-speed rail (HSR) service throughout California's major population centers.

The California High-Speed Rail Authority (Authority) has contracted a joint venture between URS, Hatch Mott MacDonald (HMM), and Arup (collectively the Regional Consultant [RC]) to perform geotechnical engineering services in support of preliminary engineering for procurement (PE4P) for the portion of the CHSTP that extends between Fresno and Bakersfield.

This *Geotechnical Data Report* (GDR) presents findings from the ground investigation (GI) performed for PE4P pertaining to the Construction Package 4 (CP4) limits of the alignment extending from approximately 1 mile north of the border between Tulare and Kern Counties to the junction of Santa Fe Way and 7th Standard Road in Kern County. CP4 spans approximately 28.7 miles passing through rural agricultural land, then through the towns of Wasco and Shafter and terminating in the sparse industrial agricultural area along Santa Fe Way. The GI included proposed exploration locations along the A1, L1, and WS1 alignments.

The purpose of this report is to present the geotechnical data collected to date (including studies from the 15% design phase) and to support the Authority in future studies of the proposed improvements.

The CP4 GI was performed in general conformance with Technical Memorandum (TM) 2.9.1 Geotechnical Investigation Guidelines (Rev 1, July 23, 2011), TM 2.9.2 Geotechnical Reports Preparation Guidelines (Rev 1, July 23, 2011), and Notice to Designers (NTD) R1 (February 17, 2011).

The RC conducted the GI between August 19 and November 13, 2013; it consisted of 20 rotary-wash boreholes and 45 cone penetration tests (CPTs). The RC conducted the CP2-3 GI and CP4 GI concurrently, as access was made available to borehole locations. In general, soil samples were obtained at 5-foot intervals to the bottom of each borehole using driven standard penetration test (SPT) samplers, driven California modified samplers, pushed Shelby tube samplers, and Pitcher barrel samplers. All samples were classified in accordance with the Unified Soil Classification System (USCS).

At the completion of drilling, standpipe piezometers were installed in four boreholes to monitor seasonal groundwater fluctuations; the remaining boreholes and all CPTs were backfilled with neat cement grout, in accordance with local permitting agency regulations.

Laboratory testing was performed on representative soil samples to obtain index and engineering properties. Geotechnical index testing included moisture content, No. 200 sieve wash, hydrometer, grain-size analysis, and Atterberg limit tests. Laboratory testing for engineering properties included direct shear, triaxial undrained and drained, compaction, California Bearing Ratio, and corrosion test methods. Soil corrosivity was tested for by resistivity, pH, sulfate content, and chloride content methods.

In situ testing performed during the exploration program included SPTs, pocket penetrometer and torvane testing on retrieved samples, shear wave velocity measurements in select boreholes and CPTs, and pore water pressure dissipation tests in 43 of 45 CPTs.

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Section 1.0

Introduction

1.0 Introduction

1.1 Project Overview

In 1996, the state of California established the Authority. The Authority is responsible for studying alternatives to construct a rail system that will provide intercity HSR service on over 800 miles of track throughout California. This rail system will connect the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Authority is coordinating the project with the Federal Railroad Administration. The CHSTP is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology that will include state-of-the-art safety, signaling, and automated train-control systems.

The statewide CHSTP has been divided into a number of sections for the planning, environmental review, coordination, and implementation of the project. This GDR is focused on the section of the CHSTP between Fresno and Bakersfield, specifically the CP4 limits of the alignment extending from 1 mile north of the border between Tulare County and Kern County to 7th Standard Road. During the initial planning process, the CHSTP alignment alternatives are dynamic and subject to revision. This report includes alignment information developed for 15% design, and minor alignment differences between this report and completed PE4P design should be anticipated.

1.2 Project Description

1.2.1 Fresno to Bakersfield High-Speed Rail Section

The proposed Fresno to Bakersfield (FB) Section of the HSR is approximately 114 miles long and traverses a variety of land uses, including farmland, large cities, and small cities. The FB Section includes viaducts, elevated structures, retaining walls and segments where the HSR will be at-grade or on embankment. The route of the FB Section passes by or through the rural communities of Bowles, Laton, Conejo, Armona, and Allensworth and the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield.

The FB Section extends from north of Stanislaus Street in Fresno to the northern most limit of the Bakersfield to Palmdale Section of the HSR at Oswell Street in Bakersfield.

1.2.2 Alignments

The FB HSR Section is a critical link connecting the northern HSR sections of Merced to Fresno and the Bay Area to the southern HSR sections of Bakersfield to Palmdale and Palmdale to Los Angeles. The FB Section includes HSR stations in the cities of Fresno and Bakersfield, with a third station in the vicinity of Hanford. The Fresno and Bakersfield stations are this section's project termini.

The FB Section of the HSR is divided into 10 subsections, most of which have multiple alternative alignments. Table 1.2-1, Figure 1.2-1, and Figure 1.2-2 illustrate the subsections and their corresponding alignments.

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Table 1.2-1
FB Alignment Subsections

Alignment Prefix	Alignment Subsection Name	Location		County	EIR/EIS Name[a]
		Begin	End		
F1	Fresno	San Joaquin St	E Lincoln Ave	Fresno	BNSF
M	Monmouth	E Lincoln Ave	E Kamm Ave	Fresno	BNSF
H	Hanford	E Kamm Ave	Iona Ave	Fresno and Kings	BNSF (Hanford East)
HW	Hanford West Bypass	E Kamm Ave	Idaho Ave		Hanford West Bypass 1 & 2
HW2	Hanford West Bypass	E Kamm Ave	Iona Ave		Hanford West Bypass 1 & 2 Modified
K1	Kaweah	Idaho Ave	Nevada Ave	Kings	Hanford West Bypass 2 (at-grade) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])
K2		Idaho Ave	Nevada Ave		Hanford West Bypass 1 (at-grade) (connects to C3 [BNSF through Corcoran])
K3		Iona Ave	Nevada Ave		BNSF (Hanford East) (connects to C3 [BNSF through Corcoran])
K4		Iona Ave	Nevada Ave		BNSF (Hanford East) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])
K5		Iona Ave	Nevada Ave		Hanford West Bypass 2 Modified (below-grade) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])
K6		Iona Ave	Nevada Ave		Hanford West Bypass 1 Modified (below-grade) (connects to C3 [BNSF through Corcoran])
C1	Corcoran	Nevada Ave	Ave 128	Kings and Tulare	Corcoran Elevated
C2	Corcoran Bypass	Nevada Ave	Ave 128		Corcoran Bypass
C3	Corcoran	Nevada Ave	Ave 128		BNSF (through Corcoran)
P	Pixley	Ave 128	Ave 84	Tulare	BNSF

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Table 1.2-1
FB Alignment Subsections

Alignment Prefix	Alignment Subsection Name	Location		County	EIR/EIS Name[a]
		Begin	End		
A1	Allensworth Bypass	Ave 84	Elmo Hwy	Tulare and Kern	Allensworth Bypass
A2	Through Allensworth	Ave 84	Elmo Hwy		BNSF (through Allensworth)
L1	Poso Creek	Elmo Hwy	Whisler Rd	Kern	Allensworth Bypass (connects to BNSF [through Wasco-Shafter])
L2		Elmo Hwy	Poplar Ave		Allensworth Bypass (connects to Wasco-Shafter Bypass)
L3		Elmo Hwy	Whisler Rd		BNSF (through Allensworth) (connects to BNSF [through Wasco-Shafter])
L4		Elmo Hwy	Poplar Ave		BNSF (through Allensworth) (connects to Wasco-Shafter Bypass)
WS1	Through Wasco-Shafter	Whisler Rd	Hageman Rd	Kern	BNSF (through Wasco-Shafter)
WS2	Wasco-Shafter Bypass	Poplar Ave	Hageman Rd		Wasco-Shafter Bypass
B1	Bakersfield Urban	Hageman Rd	Oswell St	Kern	BNSF (Bakersfield North)
B2	Bakersfield Urban	Hageman Rd	Oswell St		Bakersfield South
B3	Bakersfield Urban	Hageman Rd	Oswell St		Bakersfield Hybrid

[a] Environmental Impact Report/Statement

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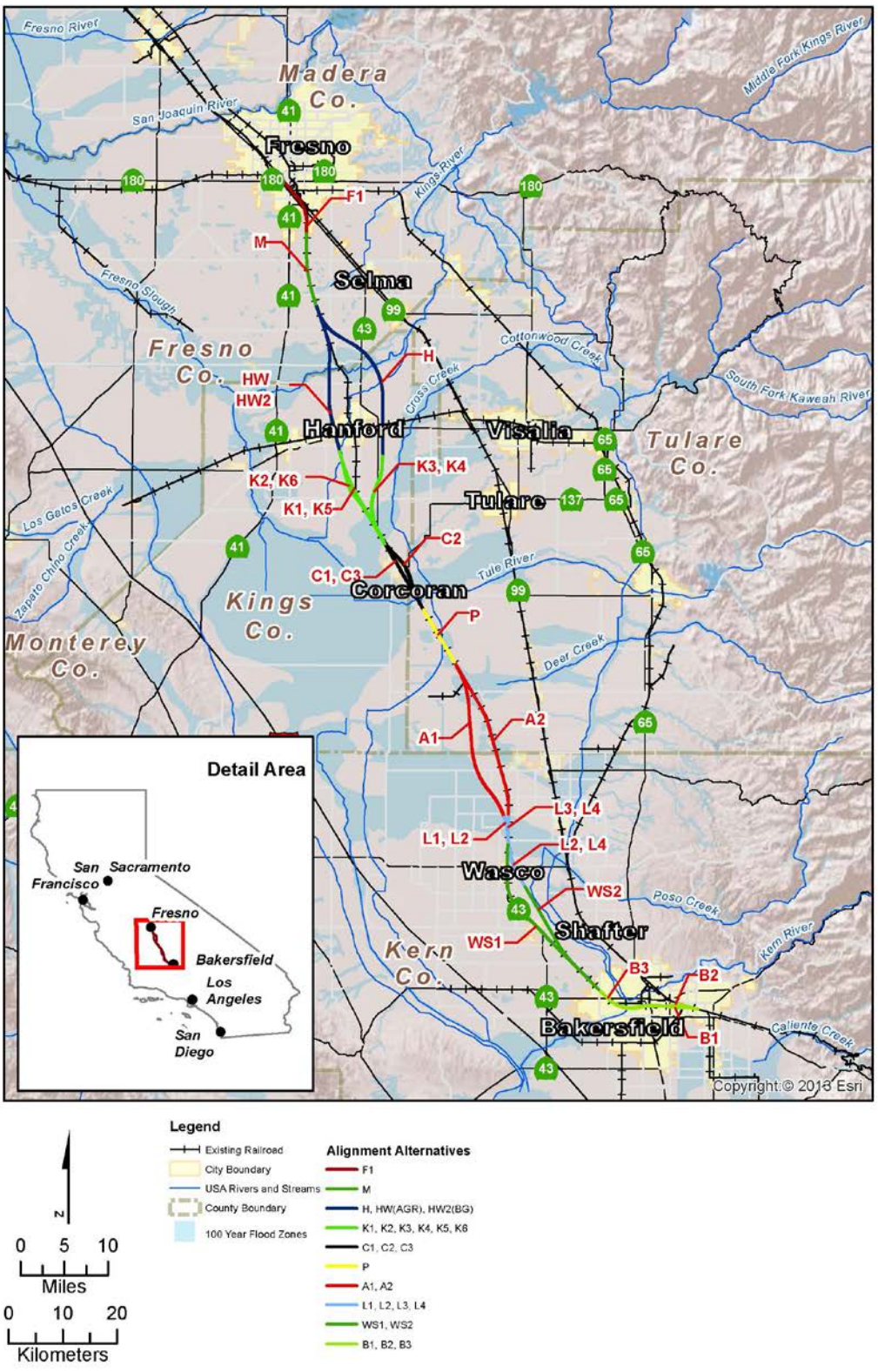


Figure 1.2-1
Overview of Alignments

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CP4 spans approximately 28.7 miles, traversing a mile of Tulare County through rural farm land to the Kern/Tulare county line then alongside the BNSF railroad and State Route (SR) 43 and Santa Fe Way, through the communities of Wasco and Shafter terminating at 7th Standard Road. The GI effort focused on the A1, L1, and WS1 alignments within the limits of CP4, shown in color in Figure 1.2-2.

The CP4 alignment crosses through rural areas in Tulare County and enters Kern County about 2.7 miles west of SR 43. Heading south into Kern County, the A1 alignment curves to the east and meets SR 43 at about Taussig Ave where A1 becomes the L1 alignment. The L1 alignment continues along the west side of SR 43 and the BNSF railroad until it reaches the north side of Wasco and becomes the WS1 alignment for the remainder of the CP4 limits. Through Wasco the alignment is on elevated structure/viaduct until it crosses to the east the BNSF at about Jackson Avenue returning to grade staying approximately parallel to the west side of the BNSF railroad and SR 43. The WS1 alignment rises to an elevated structure as it approaches Shafter just north of Madera Ave. Just south of Riverside Street the alignment crosses back to the west side both the BNSF railroad and SR 43. At Los Angeles Avenue, SR 43 turns south, and the alignment continues parallel to Santa Fe Way, descends to be at-grade, and terminates at the intersection of Santa Fe Way with 7th Standard Road.

The CP4 alignment includes at-grade and embankment rail sections as well as retaining walls, bridges and elevated structures. This contract also includes numerous grade separated road crossings of the HSR alignment. The design requires shallow and deep foundations, retaining walls, and earthwork embankments for the proposed improvements. The key project features are described in Table 1.2-2, from north to south. The table has been populated with the current 15% design structures, and is likely to change. The stationing presented in Table 1.2-2 has been calculated in advance of final alignment determination, and could be subject to minor changes. Please consult the structures reports for the most updated information.

Table 1.2-2
Summary of Significant Structures in CP4

Name	Approximate Start Station (ft)	Approximate End Station (ft)	Description of Location	Approximate Length[a] (ft)
At-Grade (A1)[b]	4446+50	4925+51	From south of Avenue B to south of W Sherwood Ave	47,901
At-Grade (L1) [b]	5154+50	5191+50		3,700
Retained Embankment	5191+50	5225+40	From south of W Sherwood Ave to north of Poso Creek	3,390
Structure	5225+40	5227+80	From north of Poso Creek to south of Poso Creek	240
Retained Embankment	5227+80	5271+60	From south of Poso Creek to north of Taussig Ave	4,380
At-Grade (L1) [b]	5271+60	5322+33	From north of Taussig Ave to north of Hwy 46	5,073
At-Grade (WS1) [b]	5422+50	5551+00		12,850
Retained Embankment	5551+00	5556+40	From north of Hwy 46 to north of Hwy 46	540
Structure	5556+40	5557+60	From north of Hwy 46 to south of Hwy 46	120

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Table 1.2-2
Summary of Significant Structures in CP4

Name	Approximate Start Station (ft)	Approximate End Station (ft)	Description of Location	Approximate Length[a] (ft)
Retained Embankment	5557+60	5564+80	From south of Hwy 46 to north of 4th St	710
Structure	5564+80	5682+95	From north of 4th Street to north of Prospect Ave	11,815
Retained Embankment	5682+95	5709+50	From north of Prospect Ave to north of Kimberlina Road	2,655
At-Grade	5709+50	5716+00	From north of Kimberlina Rd to Kimberlina Rd	650
Structure	5716+00	5716+70	From Kimberlina Rd to south of Kimberlina Rd	70
At-Grade	5716+70	5928+55	From south of Kimberlina Rd to south of W Fresno Ave	21,185
Retained Embankment	5928+55	5955+30	From south of W Fresno Ave to north of E Tulare Ave	2,680
Structure	5955+30	6117+25	From north of E Tulare Ave to south of Orange Street	16,195
Retained Embankment	6117+25	6151+00	From south of Orange street to south of Burbank St	3,375
At-Grade	6151+00	6293+00	From south of Burbank St to north of 7th Standard Rd	14,200

[a] Structure details do not include width and height due to ongoing design.
[b] Stationing between alignment segments is discontinuous

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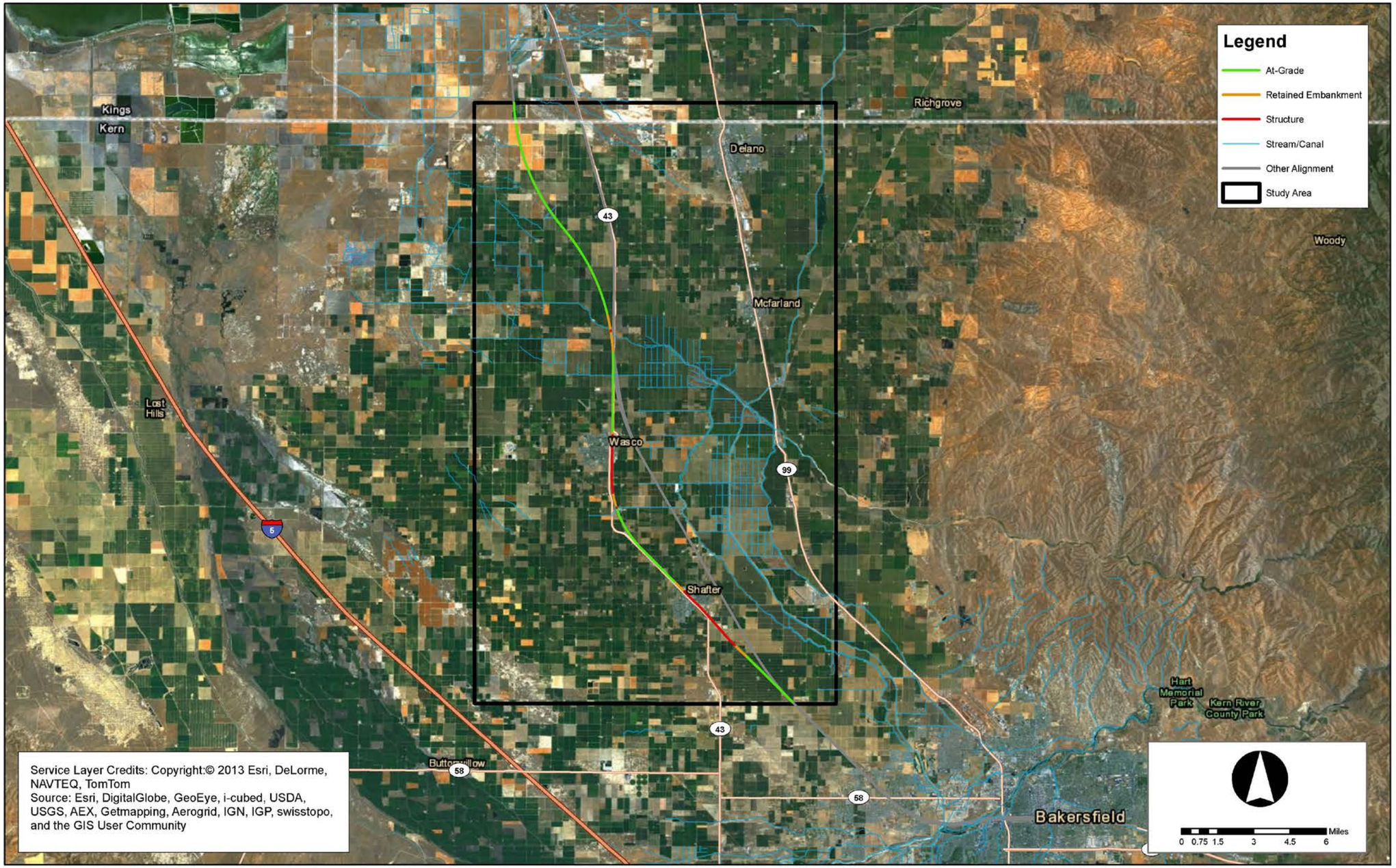


Figure 1.2-2
Site Vicinity Map

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1.3 Purpose and Scope

1.3.1 Purpose

The purpose of the PE4P FB CP4 GDR is to present the geotechnical data collected to date (including studies from 15% design phase) and to support the Authority in the procurement of contracts for final design and construction of the proposed improvements.

This report presents geotechnical data gathered in Tulare and Kern Counties to aid in the following:

- Assessing the lateral and vertical variability in subsurface soil conditions.
- Confirming the depth, seasonal, and spatial variability of groundwater.
- Supporting the development of a Geotechnical Baseline Report for Bid (GBR-B) for the procurement of CP4.

1.3.2 Scope

The RC performed a GI to obtain field and laboratory testing information on subsurface conditions to support the procurement of CP4. Supplementary surface and subsurface investigations will be required to support the final design and construction. In order to satisfy the project requirements, the subsurface investigation included the following:

- Boreholes at 20 locations to explore the subsurface stratigraphy, carry out in situ testing, and collect soil samples for visual classification and laboratory testing.
- Installation of four piezometers to monitor groundwater-level fluctuation.
- CPTs at 45 locations to supplement the boreholes, help explore the subsurface stratigraphy, and baseline geotechnical engineering parameters for the GBR-B.
- Downhole P- and S-wave suspension velocity logging (PS logging) at four locations to confirm the soil site class and baseline geophysical parameters.
- Laboratory testing to characterize the major strata and develop parameters for engineering analysis and design.

The RC developed a detailed GI specification (URS/HMM/Arup 2010) to prequalify GI and laboratory testing contractors for pricing. The team selected Gregg Drilling and Testing, Inc. (Gregg Drilling) as the recommended subcontractor to perform the PE4P FB GI work for the RC, and the Authority approved the selection. Laboratory testing was procured under a separate contract. The RC selected Inspection Services, Inc. and Technicon Engineering Services, Inc. to perform the geotechnical laboratory testing.

1.4 Available Data and Information

1.4.1 Project Sources

Available data and information for this report include data collected through desk studies, geotechnical reports prepared by the RC, and TMs prepared by the Authority and its representatives. Geotechnical reports previously prepared by the RC include the following:

- FB *Geotechnical Data Report – Historical Borehole Data* (URS/HMM/Arup 2012b).

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- FB *Final Environmental Impact Report/Environmental Impact Statement* (URS/HMM/Arup 2014).
- FB *Geology, Soils, and Seismicity Technical Report* (URS/HMM/Arup 2012a).
- FB *Geologic and Seismic Hazards Report* (GSHR; URS/HMM/Arup 2013a).
- FB *Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4* (URS/HMM/Arup 2013b).
- FB *Water Quality/Hydrology Report* (URS/HMM/Arup 2013d).

Available TMs, NTDs, and other information from the Authority and its representatives related to geotechnical and geological investigations, and geotechnical engineering pertinent to the preparation of this report include the following:

- TM 2.9.1 Geotechnical Investigation Guidelines (Authority 2011a).
- TM 2.9.2 Geotechnical Reports Preparation Guidelines (Authority 2011b).
- TM 2.9.3 Geologic and Seismic Hazard Analysis Guidelines (Authority 2011c).
- TM 2.9.10 Geotechnical Design Guidelines (Authority 2011d).
- TM 2.10.4 Seismic Design Criteria (Authority 2011e).
- NTD No. 01 – Geotechnical Investigations for Preliminary Design, R1 (Authority 2011f).
- NTD No. 03 – Preliminary Engineering (30% Design) Scope Revisions, R0 (Authority 2011g).
- NTD No. 08 – Geotechnical Boring and Sample Identification, Handling and Storage Guidelines R0 (Authority 2011h).
- Interim 30% Design Spectra for FB (Authority 2011i).

1.4.2 Information from Other Sources

The RC collected available geotechnical data from historical projects near the study area as part of 15% geotechnical design efforts. The primary source of publicly available geotechnical data is the California Department of Transportation (Caltrans) collection of as-built construction records. Caltrans data are concentrated along SR 58, SR 43, and SR 99, from projects dating between 1953 and 2008. For each project, several boreholes were drilled, logged, and plotted on a cross section. None of the Caltrans records contain laboratory test data.

Borehole records collected from Caltrans extend to a maximum depth of 100 feet below ground surface (bgs). Of the 322 historical borings included in this report, 26 borings extend greater than 70 feet bgs. One report includes 29 borings that are 1 foot deep for pavement evaluations, but the report is included because the remainder of explorations on the site are deeper. Excluding the 1-foot-deep borings, the average depth is 44 feet. Four historical Caltrans sites are within 0.5 miles of the alignment, most typically where the proposed railway alignment is in close proximity to the existing SR 43 alignment. The remaining locations included in our search are between 0.5 and 10 miles from the alignment. All relevant data from these records have been included as an attachment to this report in Appendix A.

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1.5 Report Structure

The report begins with an Executive Summary, and Section 1 provides an introduction to the project including a project description, report purpose and organization, and a summary of available data and information. Sections 2, 3, and 4 describe the project setting through geology, seismicity, and hydrogeology, respectively. The GI program is described in Section 5, and the results of the laboratory testing program are summarized in Section 6. The report closes with a discussion of surface and subsurface conditions in Section 7 and limitations in Section 8. References are provided in Section 9.

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Section 2.0

Physiography and Geologic Setting

2.0 Physiography and Geologic Setting

The section provides a brief description of the project physiography, geologic deposits, and seismicity, all of which are described in detail in the FB GSHR (URS/HMM/Arup 2013a).

2.1 Physiography

The CHSTP FB alignment is in the south portion of the Great Valley Geomorphic Valley (commonly referred to as the San Joaquin Valley [SJV]). The topography of the Great Valley is relatively flat; it is bordered by the Pacific Coast Range to the west, the Klamath Mountains and Cascade Range to the north, the Sierra Nevada to the east, and San Emigdio and Tehachapi Mountains to the south.

Superimposed upon this large-scale, relatively flat topography of the SJV is a localized topography caused by recent incisions of river systems. The subsequent topography comprises short, steep river/stream banks with channels at lower elevations relative to the surrounding areas. These channel bottoms range between wide, relatively flat-bottomed (with occasional rounded natural levees) and narrow gully-type valleys, depending on their age and the amount of flow. Along the CP4 alignment, these features appear to have been either channelized or redirected along more convenient routes to accommodate the present urbanization and agricultural land use.

The topography along the CP4 corridor is generally flat, but slopes gently to the south, varying between elevation (EL) 219 and 350 feet relative to the North American Vertical Datum of 1988 (NAVD88). Localized variations on the ground surface elevation occur at creeks, existing road embankments, and other man-made features such as irrigation ponds, irrigation canals, and road and rail crossings.

2.2 Geologic Setting

2.2.1 Regional Geology

The SJV comprises the southern part of the 450-mile-long Great Valley of California. It is an asymmetric structural trough that is filled with prism sediments up to 30,000 feet thick. It formed the southern part of an extensive forearc basin that evolved during the Cenozoic into today's hybrid intermontane basin. The SJV evolved through the gradual restriction of the marine basin due to uplift and emergence of the northern Great Valley in the late Paleogene, the closing off of the western outlets in the Neogene, and finally the sedimentary infilling in the Neogene and Quaternary. These sediments rest on crystalline basement rocks of the southwestward-tilted Sierran block.

Figure 2.2-1 shows a generalized cross-sectional schematic of the Great Valley deposits.

2.2.2 Geology along the Alignment

Surficial geology underlying the study area consists primarily of Quaternary alluvial, basin, and Pleistocene nonmarine deposits of clay, silt, sand, and gravel with varying grain sizes and content. The soil type and consistency of these deposits vary by location. Figure 2.2-2 shows a geologic and hydrogeologic cross section interpreted by Lofgren and Klausing (1969), and Figure 2.2-3 provides a summary of information of the mapped surficial geology in the vicinity of the CP4 alignment. Lacustrine deposits are mapped in the location of the former Tulare Lake Bed, located within one mile of the northern extent of the CP4 alignment.

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Table 2.2-2 summarizes the prevalent geologic units anticipated to be encountered along the alignment from north to south based on Figure 2.2-3. The lacustrine deposits may potentially underlie the northernmost extent of the CP4 alignment, as surficial lacustrine deposits of the historic Tulare Lake Bed are mapped immediately to the north.

Table 2.2-1
Mapped Surficial Geologic Units in the Vicinity of CP4

Map Symbol	Geologic Unit Type	Description
Qf	Recent alluvial fan deposits	Sediments deposited from highlands surrounding the Great Valley composed of granitic sand and silt
Qb	Basin deposits	Sediments deposited during flood stages of major streams in areas between natural stream levees and fans; silts and clays
Ql	Lake deposits	Clay, silt, and fine sand of lake beds in former Tulare Lake
Qc	Pleistocene nonmarine sedimentary deposits	Older alluvium, slightly consolidated and dissected fan deposits composed of sand, gravel, and cobbles
Source: CDMG 1964.		

Table 2.2-2
Mapped Predominant Surficial Geologic Units by Area

Alignment Alternative	Predominant Unit
A1	Basin Deposits (Qb)
L1	Alluvial fan deposits (Qf)
WS1	Alluvial fan deposits (Qf) and Pleistocene non-marine (Qc)
Source: CDMG 1964.	

The near-surface geological strata along the alignment can be divided into two Quaternary Pleistocene and Holocene depositional environments. The lithological descriptions herein are taken from CDMG (1964), Lofgren and Klausing (1969), and Dale et al. (1966), with further information on the Tulare Lake bed clays from Page (1983). This report avoids the use of formation names because of a lack of agreement across geological references.

The schematic cross section drawn by Lofgren and Klausing (1969) is redrawn and included in this report as Figure 2.2-2 as a reference for southern SJV stratigraphy; however it is not sufficiently detailed or intended for use in design. Lofgren and Klausing drew the cross section following the border between Tulare and Kern Counties from east of the town of Richgrove to about 10 miles west of the A1 alignment.

The provenance of each deposit is typically the Sierra Nevada granitic rock, which yields arkosic sands and gravels. Some material deposited could originate in the mudstones of the Coastal Ranges, but these deposits are typically further west in the SJV.

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At the northern end of the CP4 alignment, lacustrine clays associated with the Tulare Lake bed dominate the subsurface stratigraphy. At the lacustrine depositional fringes, interdigitating with "beach sand" is possible. Further south, the depositional environment is dominated by alluvial deposits, resulting in interbedded sands, silts, and clays. Gravelly deposits associated with the Kern River alluvial fan are generally to the south and east of the CP4 study area.

The continental deposits range in thickness from about 2,300 to greater than 3,000 feet from the ground surface. Underlying these recent (continental) alluvial and lacustrine deposits are Pleistocene and Pliocene marine deposits consisting of indurated clays (often referred to as claystones and mudstones), and sands of varying density.

Bedrock is about 6 miles bgs, but becomes shallower with proximity to Bakersfield and the Tehachapi foothills.

Portions of southwestern Tulare County and northern Kern County are mapped within the former boundary of the Tulare Lake Bed Ql (Quaternary lake deposit), based upon the CDMG geological map (1964). The USGS indicates lacustrine and marsh deposits beneath the former lake bed "constitute a thick plug of clay and silt from which lenses of clay and silt emanate at irregular intervals, are in places greater than 3,600 feet thick." Six well-defined lenses of clay (designated "A" through "F") underlie the central part of the SJV. The Corcoran Clay Member of the Tulare Formation (or "E" Clay) is the most well-known and extensive of these layers. According to Lofgren and Klausing (1969) the Corcoran Clay layer underlies the alignment at depths of 220 to 250 feet bgs and is about 10 to 50 feet thick at the northerly end of the CP4 alignment. The A-clay has been mapped to the west of the alignment, but likely does not extend beneath it (GEI 2012).

Numerous natural braids and constrained channels of the Kern River and Poso Creek emanating from the Sierra Nevada to the east pass through the area and are still likely to be capable of causing floods during or after high-precipitation events in their watersheds. There are a number of major reservoirs and dams up slope of the site that could cause flooding if they are breached. In addition, there are a number of small ponds or reservoirs that may pose constraints to the project.

The area from northern Bakersfield to McFarland is dominated by historical river channels trending typically east to west. An abundance of relict channels can be seen on historical aerial photography included in the GSHR; these have subsequently been infilled or channelized to facilitate modern agricultural land. The geologic map of the Kern River indicates the area is underlain by Recent Great Valley fan deposits (Qf) and Recent Great Valley basin deposits (Qb), (CDMG 1964). These deposits are likely to be of fluvial origin and composed of gravels and medium to coarse sands.

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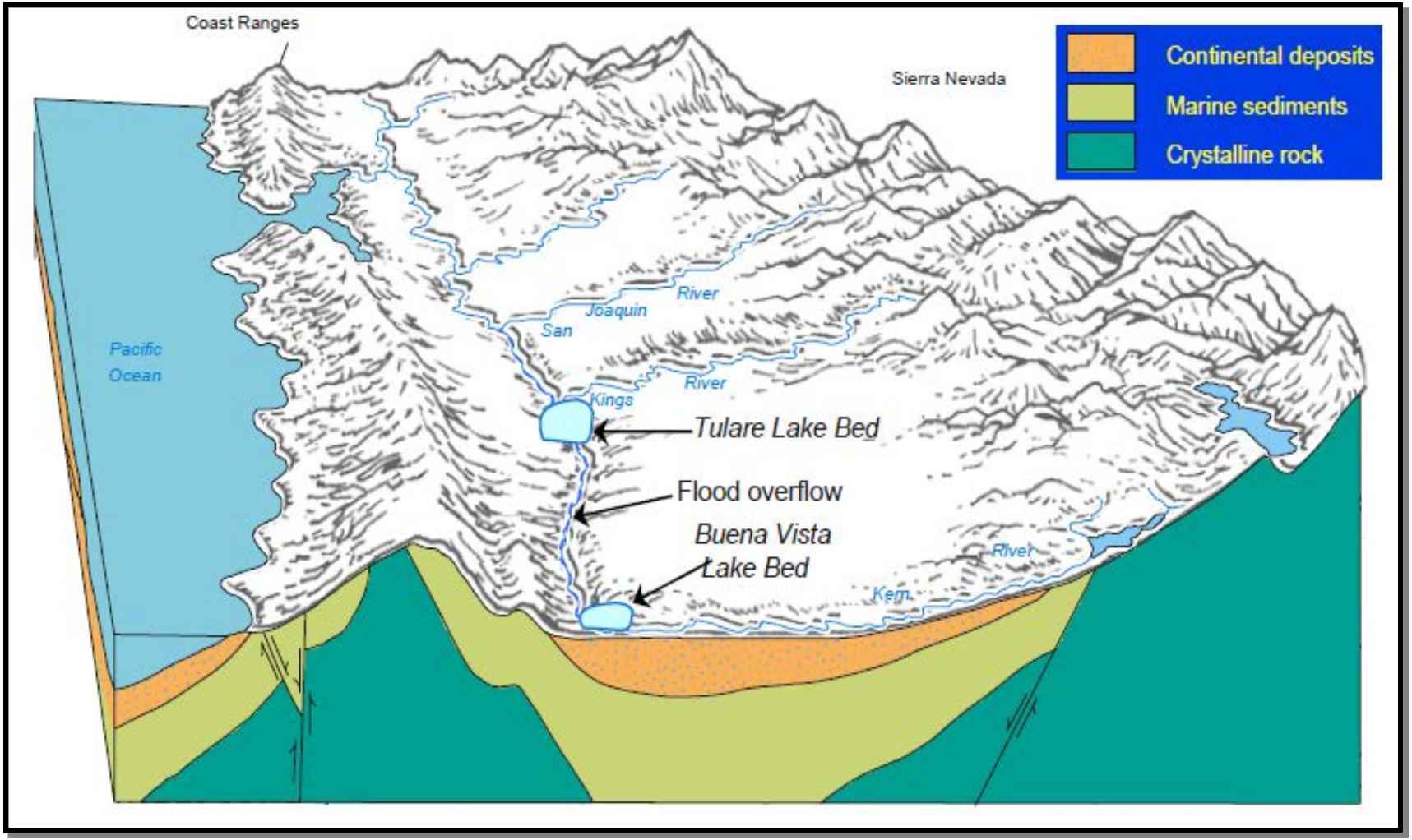


Figure 2.2-1
Cross Section of Great Valley Geomorphic Province (Page 1986)

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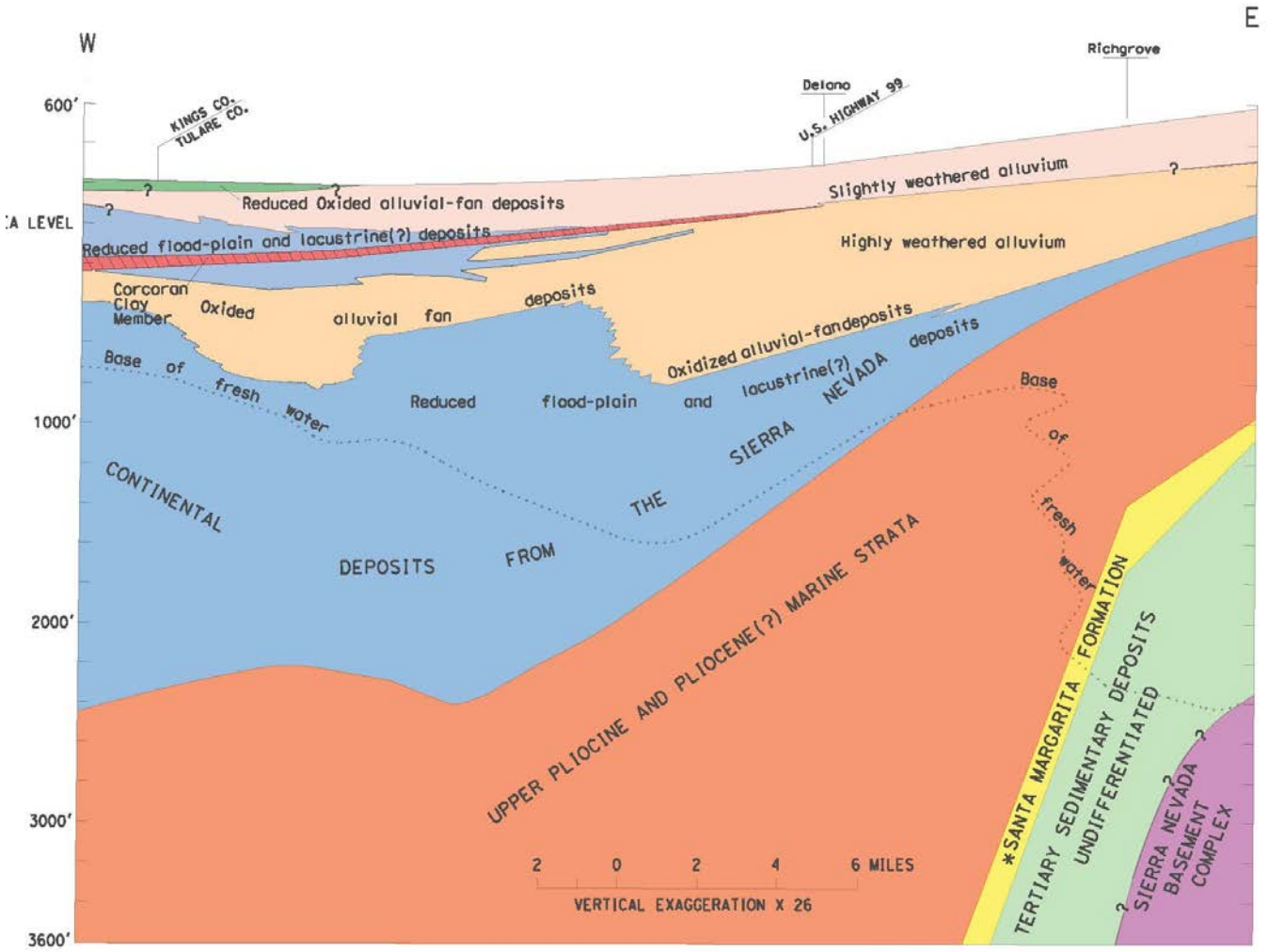


Figure 2.2-2
Schematic Geologic and Hydrogeologic Cross Section of Southern San Joaquin Valley (redrawn from Lofgren and Klausing 1969)

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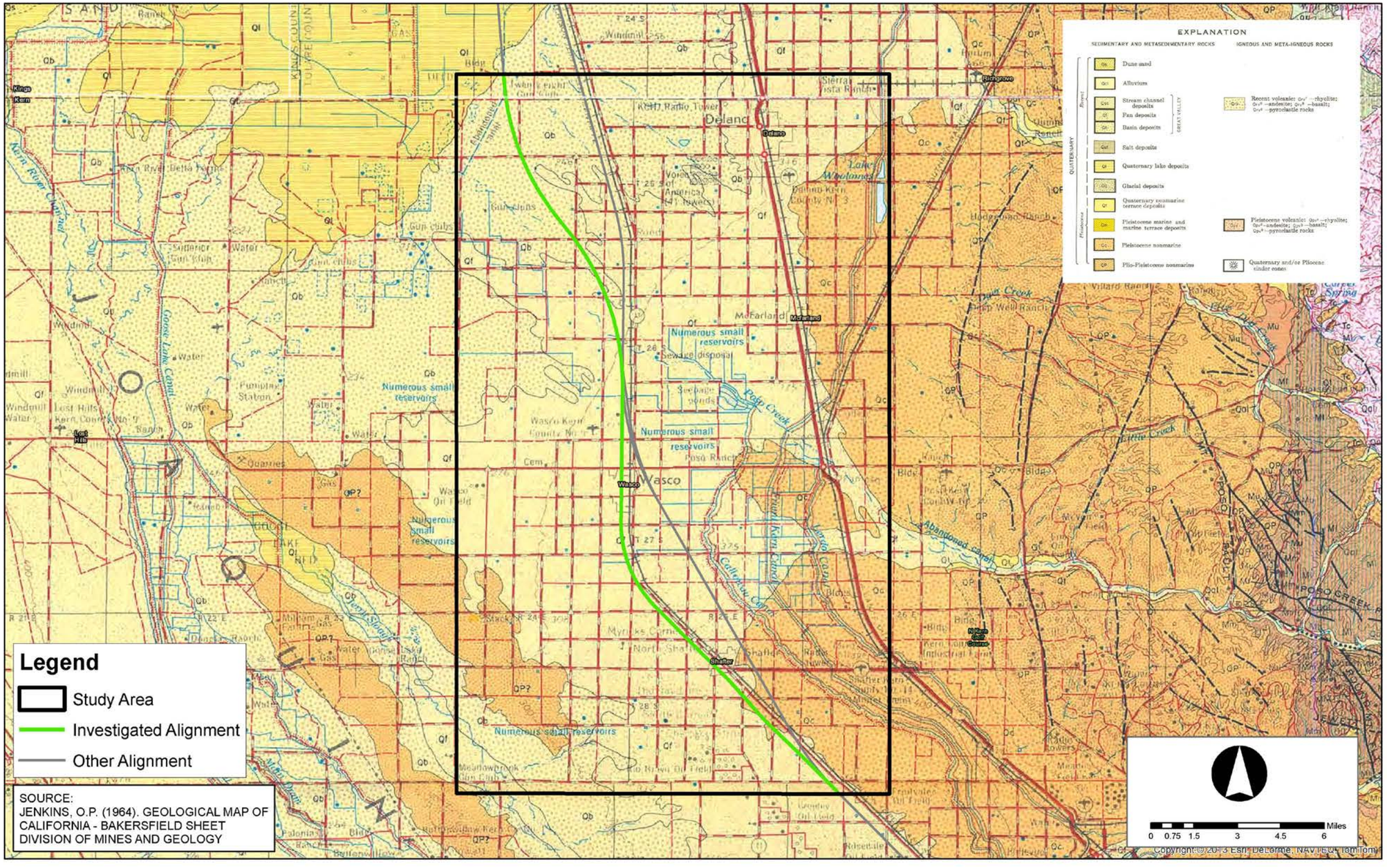


Figure 2.2-3
Local Geology in the Study Area (Jenkins 1964)

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Section 3.0

Seismic Setting

3.0 Seismic Setting

3.1 General Seismic Setting

The study area is within a relatively seismically quiescent region between two areas of documented tectonic activity: the Coast Ranges-Sierran Block boundary zone to the east and the Pacific Coast Ranges boundary zone to the west.

The Coast Ranges-Sierran Block, which follows the physiographic boundary between the Coast Ranges and Great Valley geomorphic provinces, contains potentially active blind thrust faults (Unruh and Moores 1992). Based on the size of historical events and on the inferred subsection of the boundary zone, these blind thrust faults are capable of producing moderate to large earthquakes. The Pacific Coast Ranges contain many active faults that are associated with the northwest-trending San Andreas Fault System (Jennings 1994), which is the principal tectonic element of the North American/Pacific plate boundary in California.

In the SJV, seismic slip is partitioned onto subsidiary structures, such as the San Andreas, Garlock, and Great Valley Faults, which are distributed across the Great Valley geomorphic province but not in close proximity to the study area.

3.2 Capable Faults

There are no known capable faults crossing or within close proximity to the alignment within the study area.The Pond-Poso Creek Fault is known to cross the CP4 alignment near Woollomes Avenue in Kern County. Although not considered active, the Pond Poso Creek Fault is a quaternary fault with a structural relationship to an active fault—the Pond Fault. The Pond Fault is about 2 miles to the east of the alignment. It's activity has been determined to be associated with groundwater abstraction; it is not considered seismotectonically active. Based on the definitions in the TM's the Pond-Poso Creek Fault could be deemed "capable;" however, such a classification mandates a fault rupture analysis which presumes potential seismic activity. Neither the desk study nor field investigation support the contention that this fault is seismically active.

No visible surface feature was present along Magnolia Avenue, just southeast of where the Pond-Poso Creek Fault is mapped cross the A1 alignment. However, the GIS locations of faults are known to be off by up to 750 feet (BP FHER 2012?). While the CPT's pushed in the area (S0248CPT, S0249CPT, S0252CPT, and S0254CPT) did not indicate offset in the soil strata, further site-specific investigations using other methods may be warranted to finalize the determination of the capability of the Pond-Poso Fault for final design.

The San Andreas Fault, located approximately 35 miles west of the CP4 alignment, has the highest slip rate and is the most seismically active of any fault near the HSR alignment. The White Wolf Fault is about 25 miles south of the alignment, and it produced a magnitude 7.5 earthquake when it ruptured in 1952. The San Andreas, White Wolf, Garlock, Kern Canyon, Edison, and Tehachapi Creek Faults and other nearby faults are deemed "capable" by HSR standards and are described in detail in the FB GSHR (URS/HMM/Arup 2013a).

There are a number of other faults capable of producing large magnitude earthquakes near the HSR alignment. A list of known faults within 100 miles of the study area and their characteristics is presented in Table 3.2-1. These faults are shown in Figure 3.2-1 along with other mapped Quaternary faults in the vicinity of the study area.

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Table 3.2-1
Characteristics of Faults within 100 miles of the Study Area (USGS 2006)

Fault Name	Fault Type	Slip Rate (mm/yr)	Distance and Bearing to FB HSR Alignment
San Andreas	Right-Lateral Strike-Slip	20–35	35 miles W of alignment at Wasco
Great Valley (Segments 10–14)	Blind Thrust	1.5	32 miles W of alignment at Wasco
Nunez		–	65 miles NW of northern end of alignment
Clovis Fault	–	–	68 miles N of northern end of alignment
Corcoran Clay Fault Zone	Normal	–	N of the alignment from Hanford to the Kern/Tulare County line
Owens Valley	Right-Lateral Strike-Slip	1.5	84 miles NE of alignment
Kern Canyon	Normal	–	55 miles E of northern end of alignment
Kern Front	Normal	–	12 miles E of alignment at Shafter
Kern Gorge	Normal	–	18 miles E of alignment at Shafter
Buena Vista	Thrust	-	23 miles S of southern end of alignment
Southern Sierra Nevada (Independence Section)	Normal	0.1	87 miles NE of northern end of alignment
Oil Field Fault Zone[a]	Normal	–	30–35 miles E of southern end of alignment
Garlock	Left-Lateral Strike-Slip	2–10	45 miles SE of southern end of alignment
White Wolf	Left-Lateral Reverse	3–8.5	30 miles SE of southern end of alignment
Breckenridge	Normal	–	40 miles E of alignment at Shafter
Poso Creek/Pond	Normal	–	Crosses alignment approximately 3 miles south of border between Tulare and Kern Counties
Wheeler/Pleito	Normal	1.4	30 miles S of southern end of alignment
Edison Fault	Normal	–	22 miles SE of southern end of alignment
Southern Sierra Nevada (Haiwee Reservoir)	Normal	7–14	65 miles E of alignment

[a] These faults appear on the Caltrans 1996 Seismic Hazards Map but have apparently have been derated since they do not appear on the Caltrans 2007 Deterministic Peak Ground Acceleration Map.
Sources: SCEC 1999, WGCEP 2007, Caltrans 2007, USGS, CGS 2010.

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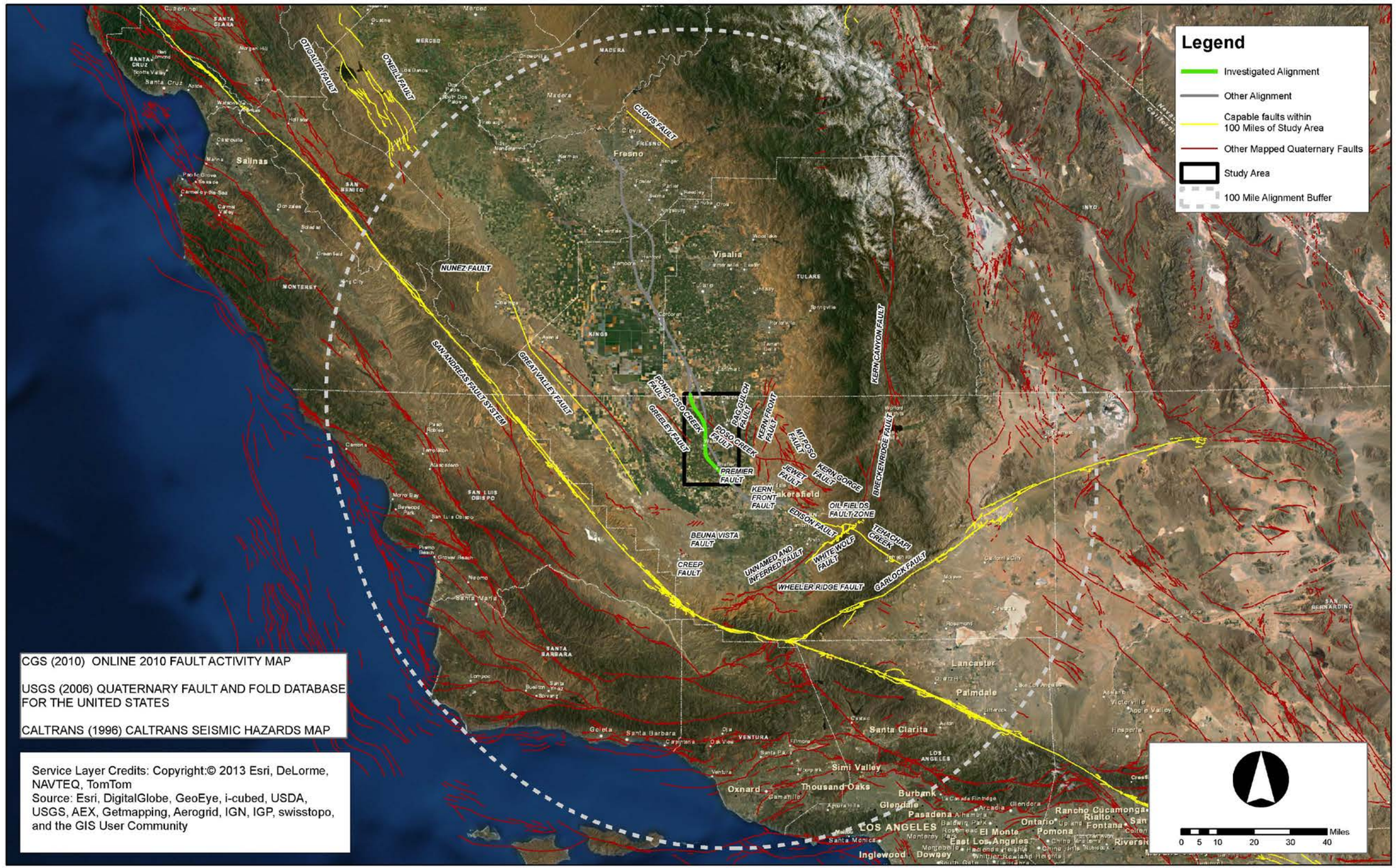


Figure 3.2-1
Mapped Faults in Vicinity of Study Area

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3.3 National Earthquake Hazards Reduction Program Site Class

Seismic site classes have been defined under the National Earthquake Hazards Reduction Program (NEHRP) and are published in the International Building Code (IBC) and Table 3.3-1 below. When developing the seismic design ground motions discussed below, the Authority and its representatives assumed an average shear wave velocity (V_{s30}) of 935 feet per second prior to any site-specific GI. Based on Table 3.3-1, this corresponds to the median shear wave velocity for Site Class D.

Table 3.3-1
NEHRP Site Class Definitions (ICC 2006)

Site Class[a]	Soil Profile Name	Average Properties in Upper 100 ft (~30 m) Shear Wave Velocity, V_{s30}	
		ft/sec	m/sec
A	Hard rock	$V_{s30} > 5,000$	$V_{s30} > 1,524$
B	Rock	$2,500 < V_{s30} \leq 5,000$	$762 < V_{s30} \leq 1,524$
C	Very dense soil and soft rock	$1,200 < V_{s30} \leq 2,500$	$366 < V_{s30} \leq 762$
D	Stiff soil profile	$600 < V_{s30} \leq 1,200$	$183 < V_{s30} \leq 366$
E	Soft soil profile	$V_{s30} < 600$	$V_{s30} < 183$

[a] As defined in 2006 IBC Section 1613.5.5 (ICC 2006).

3.4 Seismic Design Criteria

The system performance criteria approach uses design earthquakes to which HSR facilities are to be designed. As more devastating earthquakes have a lower probability of occurrence, design engineers frequently use a probabilistic approach to define earthquake hazard level. A "return period" identifies the expected rate of exceedance of a given ground motion level. In certain cases, the Authority and its representatives used deterministic methods to evaluate singular, severe earthquake scenarios based on faulting, site-to-source distance, and geologic conditions.

3.4.1 Design Earthquakes

Two design-level earthquakes are defined as follows in accordance with TM 2.10.4:

Maximum Considered Earthquake (MCE) – ground motions corresponding to greater of (1) a probabilistic spectrum based upon a 10% probability of exceedance in 100 years (i.e., a return period of 950 years) or (2) a deterministic spectrum based upon the largest median response resulting from the maximum rupture (corresponding to maximum moment magnitude) of any fault in the vicinity of the structure.

Operating Basis Earthquake (OBE) – ground motions corresponding to a probabilistic spectrum based upon an 86% probability of exceedance in 100 years (i.e., a return period of 50 years).

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3.4.2 Performance Levels

At PE4P design, the MCE corresponds to the Non-Collapse Performance Level. The main objective is to limit structural damage to prevent collapse during and after an MCE. The OBE governs evaluation of the Operability Performance Level. The design objective for the Operability Performance Level is to ensure an elastic response (within structural deformation limits) to the OBE with no spalling.

3.5 Seismic Design Ground Motions

Procedures for defining the seismic design parameters for the HSR are defined in TM 2.10.4. The ground motion package for design will be provided by the Authority under a separate cover. Site specific shear wave velocity measurements are presented below in Section 5.0.

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Section 4.0

Hydrogeologic Setting

4.0 Hydrogeologic Setting

4.1 Regional Cross Sections

The groundwater region that the HSR alignment passes through is known as the Tulare Lake Hydrologic Region. The hydrologic region is characterized by groundwater conditions that are artificially lowered, locally variable in quality and depth groundwater conditions and subject to increasing usage demands. “Groundwater levels fluctuate with seasonal rainfall, withdrawal, and recharge. The large demand for groundwater has caused subsidence in some areas of the Valley, primarily along its western side and southern end” (CDWR 2003). Depth to groundwater in the SJV ranges from a few inches to more than 300 feet. “The project study area is within the SJV Groundwater Basin and crosses through five of its seven subbasins: Kings, Tulare Lake, Kaweah, Tule, and Kern” (*FB Section: Hydrology and Water Resources Technical Report* 2012).

The regional groundwater flow direction in this area is from east to west. There are some localized influences as a result of pumping, surface water treatment, and groundwater recharge appurtenances. Historically, shallow groundwater levels have dropped as more water is abstracted than recharged (see Table 4.3-1 later in this section). Groundwater flow has increased and directions have changed in other parts of the valley due to pumping for irrigation, public supply, and recharge.

Figure 4.1-1 shows a generalized cross section of prevalent hydrogeologic conditions in the Tulare Lake Sub-Basin. Groundwater is the sole source of drinking water for much of the SJV; however, the irrigation districts along the alignment are proactive with regard to maintaining the quantity and quality of the their groundwater resources by implementing conjunctive use policies that supplement their supplies with surface water resources and recharge their aquifers (GEI 2012). The current and potential uses of groundwater in the basin are municipal and domestic supply, industrial process supply, industrial service water supply, and agricultural water supply.

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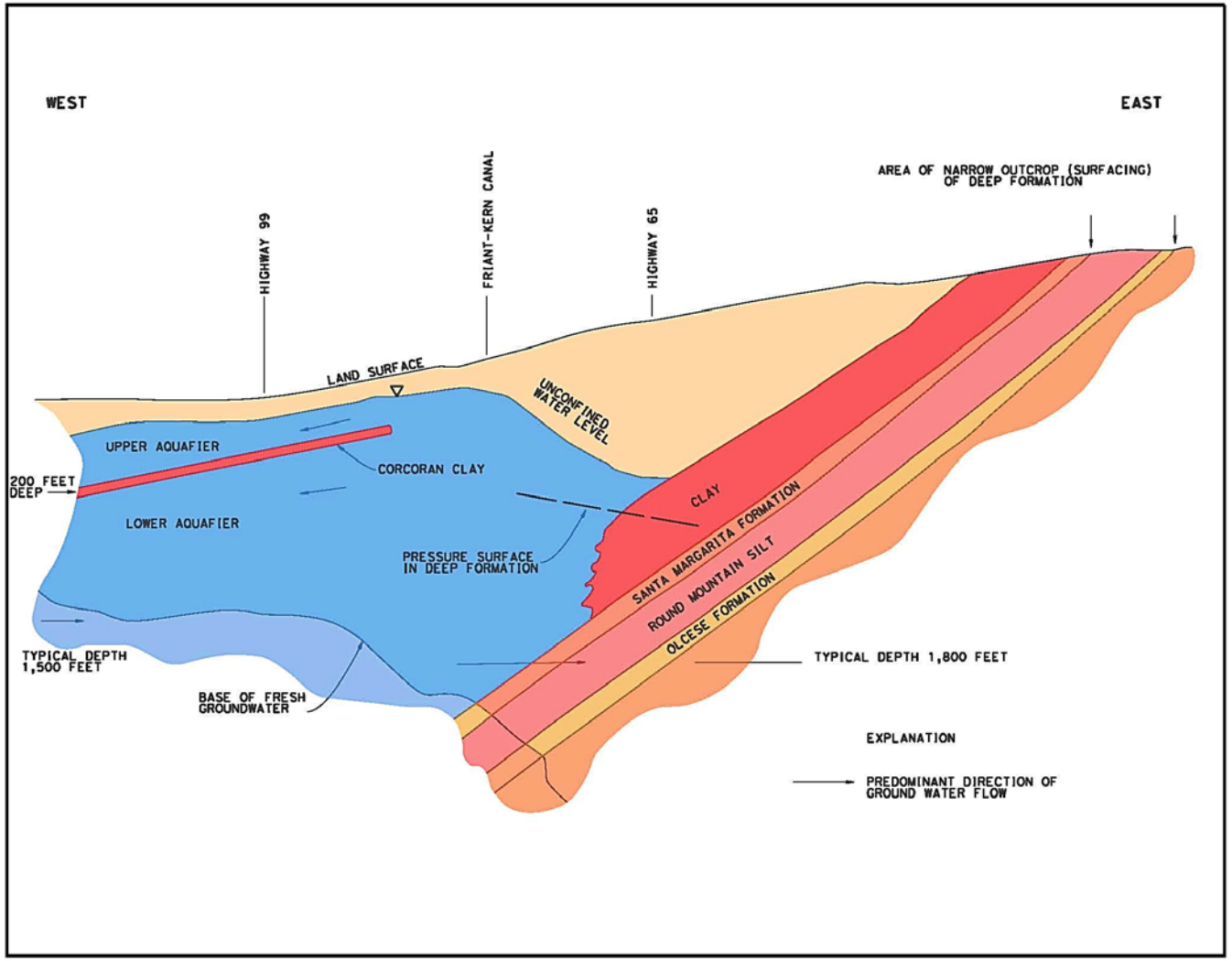


Figure 4.1-1
Tulare Lake Sub-Basin: Semi-Confined Aquifer (redrawn from Quinn 2007 and Schmidt 2001)

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4.2 Major Aquitards

The northern end of the CP4 alignment reaches the southern edge of the historical Tulare Lake Bed, so CP4 spans a transition from a number of clay layers that can act as confining beds to the unconsolidated deposits that comprise the useable aquifers in the region. Extensive, low-permeability soils that isolate the upper aquifers from the lower aquifers may exist throughout Kings and Tulare Counties (north and west of the CP4 alignment) where a pervasive very shallow perched groundwater condition is known to exist.

The confining bed that has greatest significance is known as the Corcoran Clay. The Corcoran Clay (E-Clay) underlies the northern portion of the CP4 alignment, likely extending only a few miles into Kern County. In this area, the results of previous studies indicates the Corcoran Clay is up to 120 feet thick and its depth varies from about 200 to 600 feet below the existing ground surface (Lofgren and Klausing 1969, Saleeby and Foster 2003).

4.3 Regional Groundwater Levels

4.3.1 Historical Groundwater Levels

Table 4.3-1 summarizes the historical groundwater levels along the alignment over the past 50 years according to various sources at the California Department of Water Resources (CDWR 2011) website, including groundwater wells along the alignment.

Table 4.3-1
Groundwater Table Depths (CDWR 2011)

Location	Existing Grade	Period				
		1960–65	1984–88	1998–2001	2005	2009–11
Kern/Tulare County Line	244	80	59	64	64	ND[a]
West Cecil Way	246	61	44	ND	ND	ND
Airport Ave	262	102	47	35	ND	82
Pond	283	143	83	108	282	ND
Poso Creek	307	ND	157	202	257	ND
Wasco	337	197	207	237	257	ND
Shafter	350	ND	ND	232	258	278
7th Standard Road	344	ND	174	160	204	ND

[a] ND signifies no data available for the given period and location.

The FB GSHR (URS/HMM/Arup 2013a) shows a general trend of groundwater fluctuation along the HSR alignment. All of the groundwater levels identified above are approximate, subject to seasonal fluctuations, and likely more representative of mean low conditions. The published groundwater table depths are for the unconfined aquifer and take no account of localized high-level perched groundwater tables, deeper confined aquifers, or potentially artesian or subartesian groundwater conditions.

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4.3.2 Current Groundwater Levels

Groundwater levels measured during this investigation are shallower that the measurements shown in Table 4.3-1 for the period between 2009 and 2011, but they are within the range of measurements shown for other historical periods.

In Tulare County, the results of the GI explorations indicate groundwater levels are generally between 20 and 50 feet bgs. In the vicinity of Avenue 56, where large percolation ponds are present, the results of pore pressure dissipation tests in the CPTs indicated the water table can be as shallow as between 5 and 10 feet. Shallow measurements and observations of perched groundwater was generally noted between Avenue 88 in Tulare County and the Kern County line, at depths varying from about 5 to 15 feet.

Further south, in Kern County, groundwater was identified deeper. Between the border of Tulare and Kern Counties and Elmo Highway, groundwater trends from shallow (15 to 35 feet bgs) to deeper (30 to 80 feet bgs). South of Elmo Highway, groundwater was deeper than 80 feet bgs for the majority of explorations, and most were dry to the depths explored.

The results of geophysical testing indicates groundwater may be present at about 80 feet in borehole S0077R (about 8 miles south of the Kern and Tulare County border). Above cemented layers of stiff soils, the geophysical testing indicated perched groundwater between 120 and 128 feet, and again between 140 and 148 feet in S0088R. Geophysical measurements in S0082R and S0091R indicated dry conditions to 150 feet, the maximum depth explored. The results of geophysical tests are presented in Appendix D.

The results of our current groundwater measurements and observations are presented in Sections 5.3.5 and 5.5.

4.3.3 Groundwater Chemistry

Groundwater chemistry is discussed in detail in the FB GSHR (URS/HMM/Arup 2013a). Percolation of agricultural runoff has increased levels of nitrates, pesticides, and herbicides in shallow groundwater in the SJV. The natural groundwater already contains elevated bicarbonate (HCO_3) ions in runoff from the Sierra Nevada to the east and elevated sulfates (SO_4) from runoff from the Coast Ranges to the west. Both ions relate to the soil's potential for corrosion of buried concrete and steel. Groundwater chemistry data collection and testing are discussed in this report in Section 6.10.

4.4 Land Subsidence

The FB GSHR (URS/HMM/Arup 2013a) discusses regional subsidence in detail. The areas of subsidence identified by the Jet Propulsion Laboratory (JPL 2013) indicate ongoing subsidence primarily in the vicinity of the CP2-3 alignment between June 2007 and December 2010. Subsidence has also been documented in the vicinity of Bakersfield, particularly associated with oil fields north of Oildale and northeast of Maricopa. However, Ireland et al. (USGS 1984) map the southern portion of CP4 as an "area of little or no subsidence". The areas of Allensworth, Wasco, and Shafter are associated with subsidence between 1 and 4 feet based on topographic map comparisons between 1926 and 1970.

The color-gradient contours on Figure 4.4-1 show the limits and rates of subsidence identified by JPL along the alignment options (multi colored and labeled). CDWR well number 20S21E36Q001M is located at the red dot.

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The color gradient contours represent the rate that subsidence is occurring, which is expressed along a section shown on the inset. One color gradient cycle (blue to blue) represents 12 cm/year of subsidence and the rate is highest in the center of the bowl.

The CP4 alignment begins near the southern fringes of this bowl, which extends from just north of Hanford south to town of Allensworth (located on SR 43 about 6 miles west of Earlimart). For reference, on the inset, the portion of the A1 alignment within the study area begins at about-20 km on the black dashed section line, and the Tulare-Kern county line is at about -25 km on the inset (JPL 2014). Thus, between the northern terminus of the CP4 alignment and the about Pond Road the alignment appears to be subsiding at a rate of about 3 cm/yr.

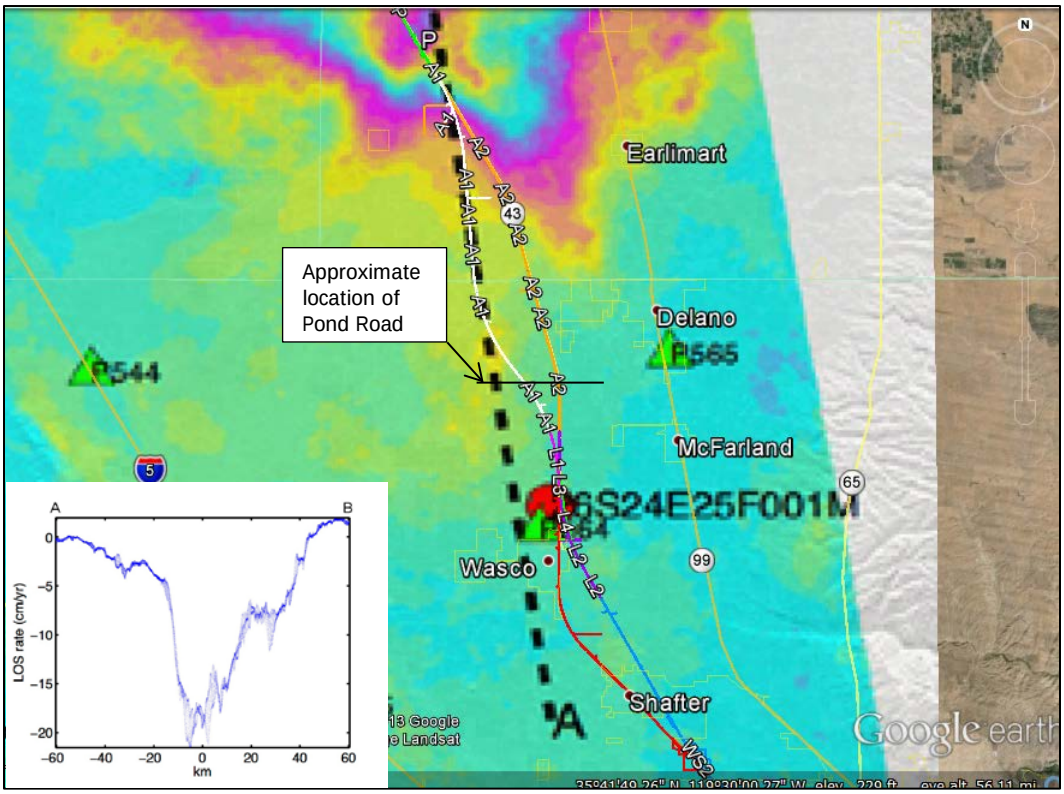


Figure 4.4-1
Subsidence Color Gradient with Rate Section (after JPL 2014)

Further south, in Kern County, Lofgren and Klausing (1969) indicate that the area between the border of Tulare and Kern Counties and Wasco experienced subsidence on the order of 2 feet between 1948 and 1962. It is possible that continued subsidence in this area has occurred in the intervening timeframe.

4.5 Methane Gas Hazard

Landfills are known sources of methane gas and may pose a hazard to the CHSTP. The Wasco-Shafter Landfill is located approximately 5 miles southwest of the CP4 alignment. The McFarland / Delano facility is located approximately 5 miles northeast of the CP4 alignment. Several oil and gas fields exist near the study area.

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Section 5.0

Ground Investigation

5.0 Ground Investigation

5.1 Introduction

The RC performed the GI for the CP2-3 and CP4 study areas between August 19 and November 13, 2013. The investigation program included cone penetration testing, exploratory boreholes, downhole geophysical logging, and observation well installations.

The investigation was performed in general conformance with TM 2.9.1, Geotechnical Investigation Guidelines (Rev 1, July 23, 2011) and TM 2.9.2 Geotechnical Reports Preparation Guidelines (Rev 1, July 23, 2011), NTD No. 001 (April 16, 2010).

A map of CP4 exploration locations is presented in Figure 5.1-1, and higher scale exploration maps are presented in Appendices A and B.

5.1.1 PE4P Design

The purpose of the GI is to provide information about the subsurface soil, groundwater, and seismic conditions along the CHSTP alignment, and support development of baseline parameters for GBR-B.

5.1.2 Organization of Team

The geotechnical field team consisted of environmental professionals, geologists, and geotechnical engineers from the RC, and the drilling contractor was Gregg Drilling. Gregg Drilling supplied two CPT rigs and two rotary-wash, rotary drill rigs for the investigation. Laboratory testing of the retrieved soil samples was conducted by Technicon and ISI.

5.1.3 Field Manuals

References for field personnel included the following:

- FB GI Location Map Book (URS/HMM/Arup 2013c).
- FB *Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4* (URS/HMM/Arup 2013b).
- Health and Safety Plan for Use on the GI Program (URS/HMM/Arup 2013e).

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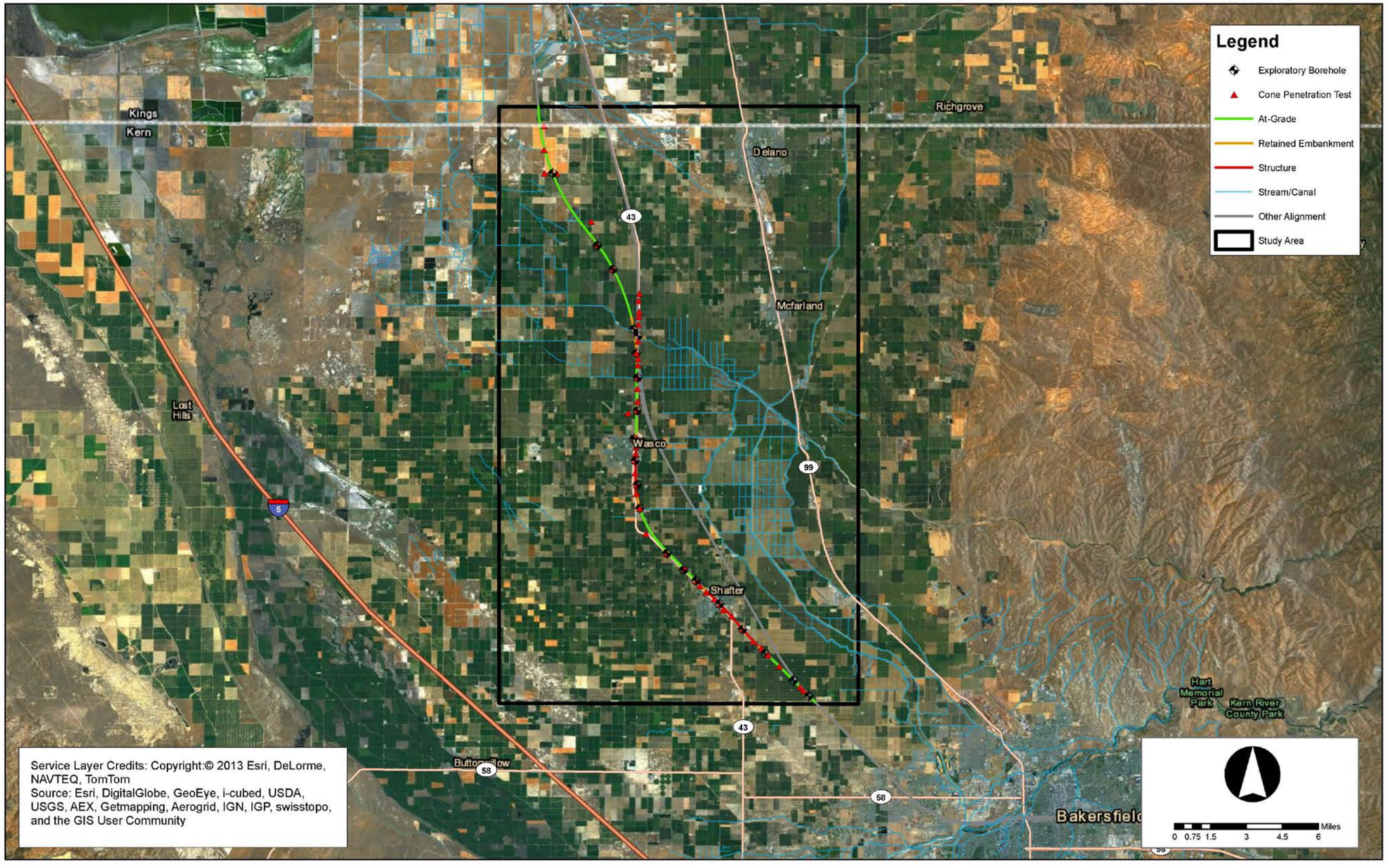


Figure 5.1-1
Map of Exploration Locations

CALIFORNIA High-Speed Rail Authority

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5.1.4 Project Restrictions

5.1.4.1 Local Regulations

The RC contacted the appropriate local jurisdictions prior to site mobilization to determine permitting fees and requirements for geotechnical drilling, well construction, borehole abandonment, and street encroachment. Permits from the following agencies were obtained for all borings and CPTs completed:

- Kern County Resource Management Agency Roads Department.
- Kern County Public Health Services Department, Environmental Health Division.
- Tulare County Resource Management Agency.
- Tulare County Health Services Division.
- Caltrans.
- City of Wasco Public Works Department.
- City of Shafter Public Works Department.

When required by regulations, an experienced traffic management subcontractor was retained by Gregg Drilling to provide traffic delineation around drilling operations.

5.1.4.2 Access Restrictions

The RC evaluated all proposed exploration locations prior to site mobilization to determine if any proposed locations were on private or access-restricted land. At locations where access issues were determined, holes were either relocated nearby or removed from the investigation. Some gaps exist in the numbering scheme at locations where originally planned exploratory holes were removed.

5.1.4.3 Environmental Regulations

Prior to site mobilization, representatives from both the RC and Gregg Drilling performed a joint site walkover. During this walkover, exploration locations identified within environmentally and/or culturally sensitive areas were either relocated nearby or removed from the investigation.

Following the site walkover, the RC applied for categorical exemption from the California Environmental Quality Act (CEQA) for each exploratory hole location. CEQA is California statute that requires state and local agencies to identify any significant environmental impacts of applicant's actions and to avoid or mitigate those impacts, if feasible.

CEQA Guidelines §15303(a) and §15304 categorically exempt GIs under the construction of limited new small facilities and minor alterations in the condition of land. CEQA Guideline §15276(a) categorically exempts regional transportation projects. GIs are exempt from CEQA under Guidelines §15306 and §15061(b) (3), provided they do not have a significant effect on the environment.

All applications for categorical exemption were granted for this investigation.

5.2 Cone Penetration Testing Program

CPTs are continuous in situ tests that record geotechnical data through a piezocone that is pushed vertically into the ground at a constant rate of about 20 millimeters per second. The piezocone consists of a conical pointed penetrometer that measures penetration resistance and a

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cylindrical sleeve that measures frictional resistance. Geotechnical parameters are measured and recorded electronically.

Gregg Drilling completed a total of 45 CPTs between August 19 and November 13, 2013. CPTs were performed following ASTM International (ASTM) test method D 5778. CPTs were completed to depths between 80.2 and 167.7 feet, depending on the alignment profile and whether refusal was met. A summary of CPT coordinates, elevations, depths, and additional in situ testing, including seismic CPTs (SCPTs) and pore pressure dissipation tests (PPDTs), is presented in Table 5.2-1. A map of test locations , and the tabulated location information are shown in Appendix C. CPT locations were spaced at an average of about 1/3 mile apart to develop subsurface soil properties for PE4P.

CPTs have a distinct advantage over boreholes because they provide a continuous profile of tip resistance, friction, and pore pressures generated during penetration while generating minimal investigation waste. The results are most useful in distinguishing changes in stratigraphy, particularly where there may be numerous soil layers with rapid changes with depth. Soft zones embedded within sandy or harder soils can be identified with reasonably good accuracy. Such lenses could be easily missed with conventional boreholes.

CPTs can be used to evaluate soil parameters such as the undrained strength and the strain modulus. Widely used procedures have been developed for using the cone data directly in estimating settlements of footings on sand, load capacities of piles, shear wave velocities, and liquefaction potential. In addition to standard CPT results, specific in situ testing was performed, including the following:

- PPDT to describe the hydrostatic water pressure and permeability of discrete strata.
- SCPT to define in situ shear wave velocities.

5.2.1 Conventional Cone Penetration Tests

Conventional CPTs were performed to measure penetration resistance, friction resistance, and pore pressure nearly continuously by pushing a piezocone at a constant rate.

5.2.1.1 Equipment

Two truck-mounted CPT rigs with 30-ton thrust capacity and hydraulic loading systems were on-site for the duration of the CPT investigations. The rigs pushed CPT cones 1 3/4 inches in diameter with a projected base area of 2 1/3 square inches. The cone sleeve friction area was 35 square inches. Push rods were 1 3/4 inches in diameter, and the grouting rods were 2 inches. The push rods and grouting rods were both 3.3 feet in length.

Each CPT cone was equipped with a porous plastic filter behind the cone tip that measured pore pressure as the piezocone was advanced and enabled dissipation testing as described in Section 5.2.3.4.

5.2.1.2 Procedures

Gregg Drilling performed CPT soundings in accordance with ASTM D 5778 procedures. At each test location, they hand-augered holes to a depth of approximately 5 feet to protect unidentified or unknown utilities. Where an obstruction was encountered during hand-augering, the hole was backfilled and a new hole was hand-augered near the original hole.

Once cleared for utilities, the hole was backfilled with sand and the CPT rig was positioned over the hole. The piezocone was pushed using the weight of the CPT rig. Results from the upper

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5 feet of disturbed soil were not included in the results but have been indicated with gray shading on the CPT logs.

Pre-punching or pre-drilling at CPT locations to proceed deeper than stiff or cemented soils was not required in CP4. The CPT locations and depths explored are presented in Appendix C.

The piezocone was pushed at a constant rate of about 1 inch per second with rod breaks at 3.3-foot intervals. An electronic data acquisition system was used to record measurements of cone tip resistance, sleeve friction, inclination, and pore pressure at about 1- to 2-inch intervals.

CPT soundings were performed to the depths proposed in the FB *Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4* (URS/HMM/Arup 2013b) or until one of the following criteria was met:

- The hydraulic capacity of the rig was reached.
- The maximum load range for the sensors was reached.
- The inclination of the push rods exceeded 15 degrees.

When one of these criteria was reached at a depth shallower than planned, the test hole was deemed to have encountered refusal and was terminated.

5.2.1.3 Locations

A summary of CPT coordinates, elevations, depths, and additional in situ testing is presented in Appendix C. A total of 45 CPTs were performed during the investigation. A map of the testing locations is also provided in Appendix C.

5.2.1.4 Results

The CPT results provided in Appendix C include plots of tip resistance, friction ratio, pore pressure, and estimated soil behavior type versus depth.

The reported pore pressure values from the CPT logs are not necessarily indicative of the known groundwater conditions, based upon the recorded levels from standpipe piezometers. At some locations, intermittent perched groundwater layers may generate localized pore pressures.

5.2.2 Seismic Cone Penetration Tests

A total of six SCPTs were conducted in accordance with ASTM D 7400 at the selected CPT locations shown in Appendix C. SCPTs measure shear wave velocities in addition to the standard piezocone parameters. A map showing SCPT locations is also provided in Appendix C.

5.2.2.1 Equipment

SCPTs use the same general equipment as described for the conventional CPTs, including the electronic data acquisition system. The primary difference is that the SCPT is fitted with a seismometer to record the arrival of shear waves generated by a surface impact source.

The surface wave was generated by striking a seismic beam fastened to the ground with a sledgehammer. Before SCPT measurements are recorded, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

A schematic of the primary elements of the apparatus including the data acquisition system is shown on Figure 5.2-1.

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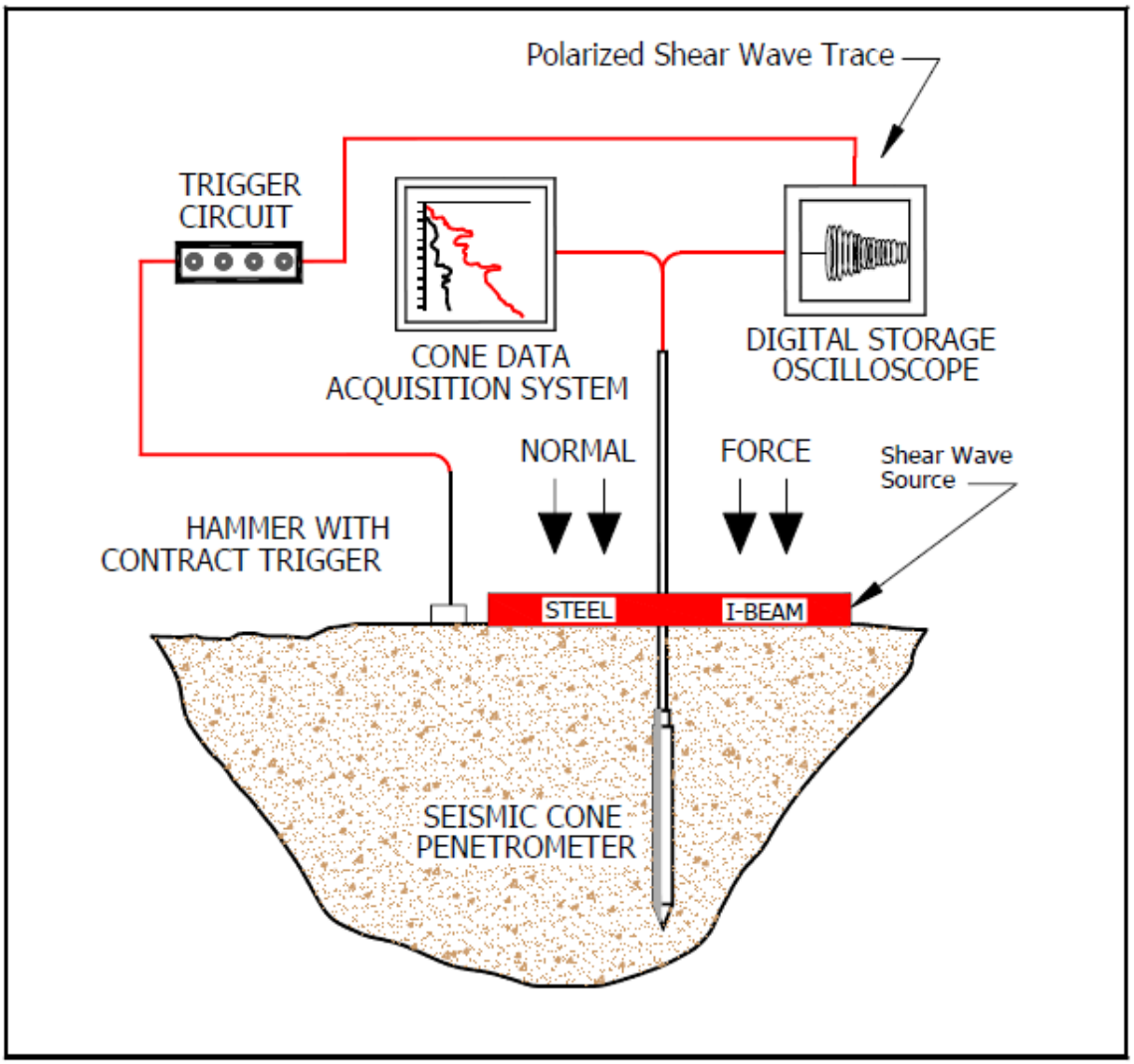


Figure 5.2-1
SCPT Schematic (Gregg Drilling 2011)

5.2.2.2 Procedures

At SCPT locations, a beam was fastened to the ground adjacent to the CPT collar. At each testing depth, the seismic beam column was struck twice on each side of the beam with a sledgehammer. The striking of the column triggers a record of shear wave velocity in the piezocone at depth. SCPTs were performed at 1-meter intervals.

The electronic data acquisition system recorded this measurement, and the operator checked for quality. When necessary, additional hammer strikes were performed at a single depth interval to ensure useable data were retrieved.

5.2.2.3 Locations

The testing locations are shown in Appendix C and tabulated in Table C-1.

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5.2.2.4 Results

Table 5.2-1 shows the results of shear wave velocities averaged over the upper 100 feet (~30 meters) of soil, V_{s30}, from SCPTs. SCPTs that met refusal shallower than 100 feet have been averaged over the depth tested. A graphical profile of measured shear wave velocities is presented in Figure 5.2-2.

Table 5.2-1
Average Shear Wave Velocities from SCPTs

CPT ID	V_{s30} (ft/s)	Site Class[a]
S0266CPT	1,042	D
S0279CPT	1,141	D
S0289CPT[b]	1,075	D
S0297CPT	1,211	C
S0312CPT	1,182	D
S0318CPT	1,215	C

[a] As defined in 2006 IBC Section 1613.5.5 (ICC 2006).
[b] Operator experienced difficulties with equipment at S0289CPT; data were not collected continuously from surface to depth.

Based upon the calculated average shear wave velocities obtained from SCPT, the ground profile is classified as Site Class D by NEHRP definitions (ICC 2006) presented above. Site Class D defines ground profiles with V_{s30} ranging from 600 to 1,200 feet per second as “stiff soil” for design purposes.

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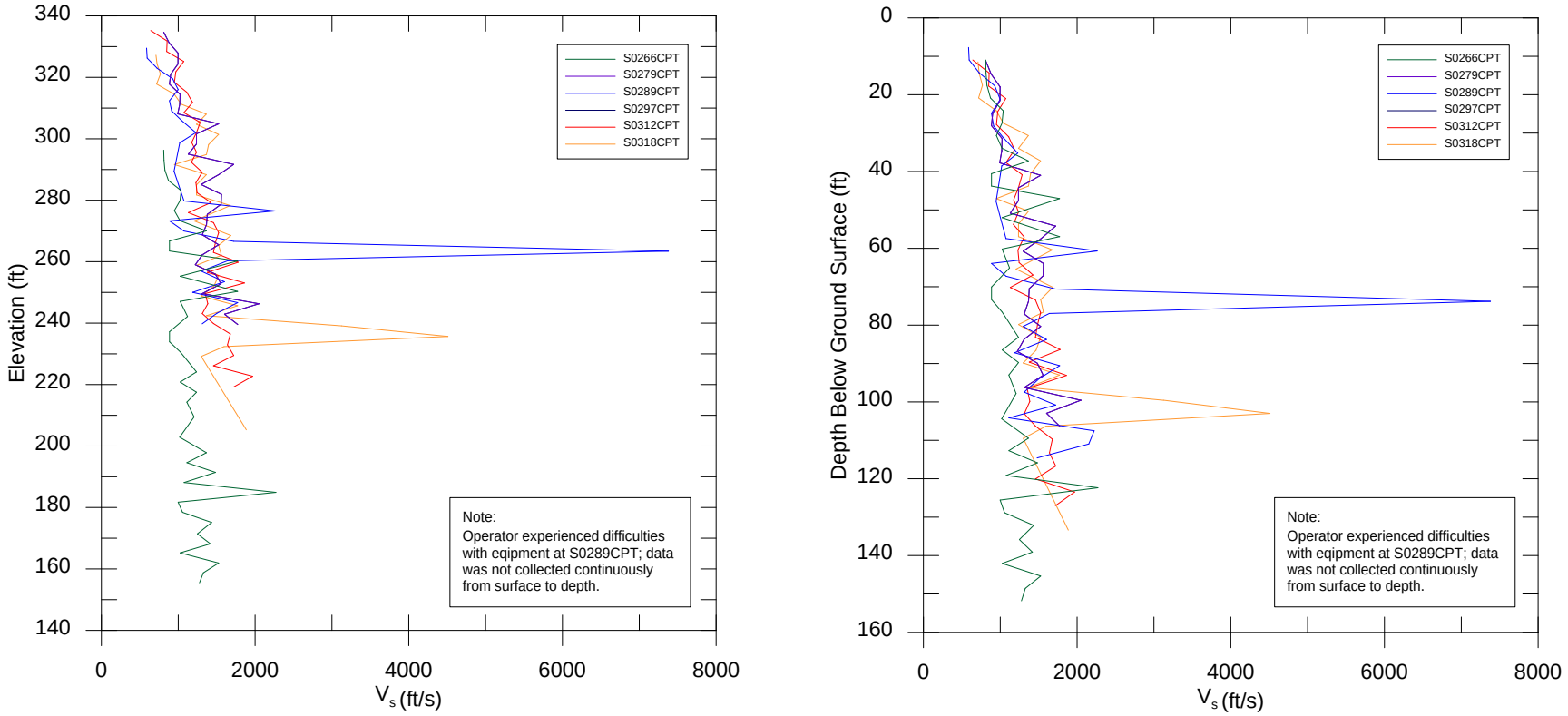


Figure 5.2-2
Shear Wave Velocity Profiles from SCPTs

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5.2.3 Pore Pressure Dissipation Testing

PPDTs were performed at 43 of 45 CPTs locations during a pause in cone penetration to measure the rate of dissipation of excess pore water pressure generated by the CPT push. The variation of the pore pressure with time was measured via a porous filter behind the cone tip. For the two CPT soundings, S0285ACPT and S0315CPT, for which PPDTs were not conducted, both were thought to be dry according to the pore pressure measurements. The dry conditions were confirmed by lowering a water level indicator.

PPDT data can be interpreted to provide estimates of hydrostatic pore water pressure and coefficients of consolidation and permeability at a soil layer of interest. Dissipation tests may be performed rapidly in sands but may take several hours in high-plasticity clays.

The rate of dissipation depends primarily upon soil compressibility and permeability characteristics. However, cone diameter will also influence results as dissipation rate increases with increasing cone diameter.

In order to correctly interpret the equilibrium piezometric pressure, the pore pressure must be monitored until all of the excess pore pressure has dissipated.

5.2.3.1 Equipment

PPDTs used the same equipment described in Section 5.2.3, including an electronic data acquisition system. Piezocones were equipped with a porous plastic filter behind the cone tip that measured dynamic pore pressure as the piezocone was advanced.

5.2.3.2 Procedures

PPDTs were performed at locations where excess pore pressures were generated during cone penetration, at depths selected by the RC field representative. PPDTs were performed in accordance with ASTM D 5778.

At selected depths, CPT operations were paused to complete the PPDT. Pore pressure was monitored during testing for a maximum of 42 minutes where required to attempt to allow excess pore pressures to dissipate. Test durations are summarized in Table 5.2-2.

5.2.3.3 Locations

This data report presents the results of 26 PPDTs. Additional tests were performed; however, the results would not provide any meaningful interpretation of the groundwater conditions as discussed below. The testing locations are shown in Table 5.2-2.

5.2.3.4 Results

A summary of PPDT results is presented in Table 5.2-2. Graphs showing pore pressure over time for each PPDT are included in Appendix C.

The results of the PPDTs are not necessarily indicative of the known groundwater conditions. Many of the PPDTs were performed at depths shallower than the known depth to groundwater, based upon the recorded levels from standpipe piezometers installed as part of this study. Moreover, many of the test results were not readily conducive to estimating the in situ permeability because either equilibrium pore pressures were not achieved or the pore pressures converged to negative values.

Table 5.2-2 includes the PPDT test results and the estimated normalized CPT soil behavior type (Robertson 1990) at the elevation of each PPDT for comparative purposes.

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Table 5.2-2
Summary of Pore Pressure Dissipation Test Results

CPT ID	Test Depth (ft)	Final Pore Pressure (ft H_20)	Test Duration (sec)	Field Measurements		Normalized Soil Behavior Type at PPDT Depth (SBT_N)[b]
				Depth to Water (ft)	Depth to Partial Sloughing[a] (ft)	
S0243CPT	56.9	40.4	1,710	35.0	55.0	4
S0246CPT	41.2	27.0	885	–	38.6	6
S0248CPT	71.2	51.1	910	–	35.0	6
S0249CPT	115.2	89.1	2,065	20.0	–	5
S0252CPT	81.7	24.6	1,450	48.0	48.0	5
S0254CPT	115.3	51.9	2,425	60.0	–	6
S0257CPT	115.8	37.2	1,880	73.0	73.0	6
S0260ACPT	100.1	16.4	2,080	76.0	–	6
S0261CPT	82.3	4.0	770	–	10.0	7
S0262CPT	115.2	35.0	365	38.0	–	6
S0263CPT	119.1	37.5	305	68.0	75.0	6
S0264CPT	67.6	–	–	–	51.0	6
S0266CPT	157.5	37.1	2,490	–	–	5
	123.5	31.1	425	–	90.0	5
S0267CPT	100.2	2.5	1,970	Dry	Open	6
S0268ACPT	100.1	–	–	Dry	Open	6
S0269CPT	110.1	–	–	–	–	5
S0270CPT	85.1	–	–	–	–	6
S0271CPT	100.9	–	–	Dry	Open	6
S0272CPT	80.2	–	–	Dry	Open	6
S0273CPT	117.5	–	–	Dry	11.0	6
	117.5	–	–	Dry	31.0	6
S0274CPT	98.6	–	–	Dry	Open	5
S0279CPT	165.0	–	–	Dry	Open	3
S0280CPT	152.4	–	–	Dry	Open	3
S0282CPT	103.3	–	–	Dry	Open	4
S0283CPT	121.7	10.2	1,580	115.0	115.0	5

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Table 5.2-2
Summary of Pore Pressure Dissipation Test Results

CPT ID	Test Depth (ft)	Final Pore Pressure (ft H_20)	Test Duration (sec)	Field Measurements		Normalized Soil Behavior Type at PPDT Depth (SBT_N)[b]
				Depth to Water (ft)	Depth to Partial Sloughing[a] (ft)	
S0285ACPT	No test	–	–	Dry	Open	–
S0287CPT	123.4	92.0	1,595	Dry	Open	5
S0289CPT	115.6	6.2	620	–	–	6
S0290ACPT	123.7	–	–	–	97.0	5
S0292CPT	94.2	–	–	Dry	Open	7
S0295CPT	107.1	–	–	Dry	Open	5
S0297CPT	110.2	–	–	Dry	Open	6
S0301CPT	100.6	–	–	Dry	Open	6
S0302CPT	136.8	40.5	1,755	130.5	132.7	6
S0303CPT	152.9	36.7	2,050	–	Open	3
S0304CPT	125.2	30.5	1,015	151.6	–	4
	163.4	12.4	650	151.6	154.5	3
S0305CPT	No test	–	–	–	–	–
S0308CPT	115.0	–	–	Dry	126.5	5
S0309CPT	144.0	–	–	–	<10	5
S0312CPT	129.6	4.0	785	Dry	122.0	6
S0314CPT	113.2	29.9	1,795	Dry	–	5
S0315CPT	105.0	–	–	–	–	4
S0317CPT	95.3	10.9	2,395	Dry	–	3
	105.0	23.5	1,830	Dry	–	3
S0318CPT	150.4	9.4	1,395	Dry	Open	6
S0318ACPT	98.8	–	–	Dry	Open	4
S0319CPT	150.1	–	–	–	–	5

[a] Hole dry at this depth unless depth to water recorded. Holes occasionally sloughed or partially collapsed prior to pushing grouting rods to total depth and backfilling with grout.
[b] After Robertson 1990.

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5.2.4 Cone Penetration Test Completion and Abandonment

All CPTs were backfilled by tremie methods with cement grout in accordance with local permitting agency regulations.

During abandonment, a sacrificial (dummy) tip and hollow rod were pushed back into the original sounding hole to the maximum depth explored. The hollow rod was pulled back to leave the sacrificial tip at the bottom of the hole, and then the hole was backfilled with neat cement grout using the hollow rod as a tremie tube.

A county inspector periodically observed the backfilling of CPTs.

5.3 Exploratory Borehole Program

5.3.1 Overview

A total of 20 exploratory boreholes were completed by Gregg Drilling from August 19 to November 13, 2013. These boreholes are as shown in Appendix B. A summary of the all borehole locations is presented in Table B-1. Borehole locations were spaced at an average of about 1 mile apart. Boreholes were drilled to a depth of 81.5 to 165 feet, depending on the type of proposed railway or roadway structure at the location.

5.3.2 Drill Rig and Hammer Types

Drilling was performed primarily using rotary-wash methods with truck-mounted rigs and drilling mud (consisting of bentonite) as the circulating fluid. Hand-augering was performed to a depth of approximately 5 feet at borehole locations to address utility concerns.

Samplers were driven with an automatic trip hammer that was calibrated on-site in a selected borehole drilled by each rig.

5.3.3 Sampling Methods and Equipment

In accordance with TM 2.9.1 (dated June 2011), the drilling team collected driven soil samples using a 2-inch-outer-diameter SPT sampler. The SPT sampler satisfies the requirements of ASTM D 1586. An interior liner was not used. Samples were also collected using a 3-inch-outer-diameter “California modified” sampler with brass or stainless steel liners. The liners used were typically 2.43 inches in inside diameter and 6 inches tall, but occasionally 1-inch tall sample rings were used to obtain samples for specific laboratory testing such as direct shear or collapse tests.

In general, samples were obtained at 5-foot intervals to the bottom of each borehole. In selected boreholes, continuous sampling or undisturbed sampling using Shelby or Pitcher barrel samplers was performed to target particular depths of interest.

A bulk sample was collected from the upper 5 feet in selected boreholes for compaction testing.

5.3.4 Handheld Field Tests

Soils appropriate for handheld field tests were rarely encountered during this phase of the investigation. When encountered, index strength tests were performed using a torvane and/or hand penetrometer device. Results of handheld field tests are indicated on the borehole logs presented in Appendix B.

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5.3.5 Groundwater-Level Measurements

Groundwater-level measurements were generally not performed during drilling due to the use of drilling mud.

To monitor groundwater levels, standpipe piezometer observation wells were installed in selected boreholes. Information on the locations, depths, and construction details of standpipe piezometer installations is presented in Appendix B.

5.3.6 Sample Handling

Samples were preserved and transported in accordance with ASTM D 4220 guidelines. SPT samples were collected and retained in re-sealable plastic bags, California modified samples were collected in 2-inch-inside-diameter by 6-inch-tall brass tubes with plastic caps and sealed with duct and electrical tape, and Shelby tube samples were collected in 2-7/8-inch-inside-diameter by either 24-inch- or 30-inch-tall aluminum tubes with expansion packers and plastic caps sealed with duct and electrical tape. Soil samples were transported periodically to a local storage facility, located at 3636 N Hazel Avenue in Fresno. At this storage facility, samples were reviewed and assigned for laboratory testing. Samples not tested will remain at the storage facility until June 30, 2014.

5.3.7 Borehole Completion and Abandonment

All boreholes that were not selected to be converted to piezometers were backfilled with cement grout in accordance with local permitting agency regulations. The field engineering team interacted with Tulare County Environmental Health Division and Kern County Public Health Services Department representatives, who periodically inspected the backfilling of boreholes.

Drill cuttings and fluids were initially collected in drums and kept adjacent to the borehole locations until each borehole was completed. Upon completion of each borehole, the drums were transported to the storage facility and consolidated in a single waste container so that the drums could be reused. At the completion of drilling operations, the waste container was characterized for contaminants and then disposed of at an appropriate licensed landfill site.

5.3.8 Borehole Log Organization and Presentation

Upon withdrawal from the borehole, the samplers were cleaned, the sample material classified visually, and the information entered into the field borehole log. The samples were classified using ASTM D 2488 standards supplemented with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010). Soil classification procedures are included in Appendix B.

5.3.9 Standard Penetration Tests

Sampling was performed in general accordance with ASTM D 1586. SPT and 2½-inch-outside-diameter “California modified” samples were driven using a 140-pound automatic trip hammer falling from a height of 30 inches. California modified samples were driven with brass liners. Blow counts for the SPT samplers were recorded for each 6-inch interval for an 18-inch drive. The criterion for sampler refusal was considered to be blow counts exceeding 50 for any 6-inch interval.

The combined blow count from the second and third 6-inch intervals is the Standard Penetration Resistance (N-value) and is shown on the borehole logs in Appendix B. It should be noted that the reported N-value has not been corrected for hammer energy, overburden, sampler size, or field procedures.

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5.3.10 Borehole Log Database

Data from the field borehole logs were entered and stored in the geotechnical database program gINT v8. Borehole logs created with gINT are included in Appendix B of this report.

5.3.11 Standard Penetration Test Hammer Energy Calibration

SPT hammer energy calibration testing was performed by Gregg Drilling on two of the rotary-wash drill rigs used for the investigation. One borehole was completed by a third rig, which was only on site for one day and its hammer was not calibrated. The purpose of testing was to measure the energy transferred from the hammer to the drill rod and to calculate the energy efficiency of the hammer. The principle of conducting the test is to standardize the energy per blow count so that a baseline measurement is established amongst the various hammers used to collect geotechnical samples. The hammer energy baseline can be used to standardize data that can be compared and analyzed.

The tests were performed on August 22, 2013, for drill rig I.D. D-44 and on September 18, 2013 for D-1. The energy calibration tests were conducted for boreholes S0021R and S0089R, respectively. Boring S0021R is located in CP2-3.

A Gregg Drilling and Testing field engineer collected measurements and data using a Model PAK Pile Driving Analyzer. Two strain gauges mounted on a 2-foot section of the drill rods measured force, while two piezoresistive accelerometers bolted on the same rod measured acceleration. The gauges were mounted approximately 6 inches from the top of the rod. Hammer energy tests were performed in accordance with ASTM D 4633.

The complete reports for each SPT energy calibration are provided as an attachment in Appendix B. The output for each recorded impact of the hammer included the following:

- Blow count in blows per foot.
- Maximum rod force.
- Maximum rod velocity.
- Maximum transferred energy.
- Blows per minute.
- Energy transferred in percent of maximum.

Results from these calibrations indicate an average measured energy transfer of 85% and 78%, respectively, for the SPT hammers D-44 and D-1 used in boreholes S0021R and S0089R.

Hammer efficiencies, data and information have been included on each borehole log presented in Appendix B.

5.4 Downhole Geophysical Logging

Site-specific velocity profiles are required to establish site classifications, estimate seismic ground motions, and perform site response analyses, as detailed in TM 2.9.6.

Downhole shear wave velocity measurements were completed in selected boreholes using the PS logging method. Logging was performed by GEOVision Geophysical Services, of Corona, California. The summary report prepared by GEOVision is included in Appendix D.

PS logging provides high-resolution measurements (typically spaced at intervals of about 1.5 feet) for the determination of in situ shear and compression wave velocities in deep, uncased boreholes.

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The test data provide detailed information regarding the variation of velocities with depth and can accurately differentiate interfaces between layers. The profiles are particularly useful in detecting relatively thin layers of either softer or harder materials that may be interbedded and would be difficult to detect from boreholes alone.

5.4.1 Field Procedures

Downhole seismic surveys were performed in accordance with ASTM D 5753 and D 7400 procedures using method suspension system, manufactured by OYO Corporation. The OYO system uses a 7-meter probe, containing a source and two receivers spaced 1 meter apart, suspended by a cable. The armored 4- or 7-conductor cable serves both to support the probe and to convey data to and from a recording/control device on the surface. The probe is lowered into the borehole to a specified depth, where the source generates a pressure wave in the borehole fluid. The pressure wave is converted to seismic waves (P and S) at the borehole wall. Along the wall at each receiver location, the P and S waves are converted back to pressure waves in the fluid and received by the geophones, which send the data to the recorder on the surface (GeoVision 2012).

Boreholes selected for PS logging were over-drilled 15 feet beyond their sampled depths and flushed with clean water. Measurements were performed in an open hole, below the level of surface casing.

5.4.2 Frequency of Testing

Downhole geophysical logging was performed in three boreholes: S0077R, S0082R, S0088R, S0091R. A map showing these PS logging locations is provided in Appendix D.

Depths of these boreholes range from 155 to 165 feet. Measurements were recorded in 1.6-foot (about 0.5-meter) Intervals. Table 5.4-1 summarizes PS logging test locations and depths.

Table 5.4-1
Summary of PS Logging

Borehole ID	Date Logged	Northing, NAD83 (FT)	Easting, NAD83 (ft)	Elevation, NAVD88 (ft)	Depth Interval Logged[a]	
					Top Depth (ft)	Bottom Depth (ft)
S0077R	10/4/2013	6,165,385	2,431,686	299	4.92	153.22
S0082R	11/7/2013	6,165,176	2,407,455	328	6.56	142.72
S0088R	11/7/2013	6,183,716	2,370,927	345	6.89	150.92
S0091R	9/24/2013	6,203,198	2,350,323	340	3.94	150.92

[a] Logging performed at 1.6-foot intervals between top and bottom depths.

5.4.3 Results

Shear wave velocities averaged over the upper 100 feet (~30 meters) of soil, V_{s30}, are presented in Table 5.4-2. A graphical profile of measured shear wave velocities is presented in Figure 5.4-1.

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Table 5.4-2
Average Shear Wave Velocities from PS Logging

Borehole ID	V_{s30} (ft/s)	Site Class[a]
S0077R	1,021	D
S0082R	1,142	D
S0088R	1,210	C
S0091R	1,207	C
[a] As defined in 2006 IBC Section 1613.5.5 (ICC 2006).		

Shear wave velocities were calculated in accordance with the procedures described in the test summary report prepared by GEOVision, provided in Appendix D. This report describes further details of the PS logging method, including test equipment, measurement procedures, and data analysis.

Based upon the calculated average shear wave velocities obtained from PS logging, the ground profile classifies as Site Class C and D by NEHRP definitions (ICC 2006) in Table 3.3-1. Occasional cemented layers identified as potential hardpan were indicated at depths indicated in Table 5.4-3.

Table 5.4-3
Depths of Cemented Soils Indicated in PS Logging

Borehole ID	Depths of Cemented Layers (ft bgs)
S0077R	38, 84
S0082R	14, 32, 100
S0088R	22, 30, 52
S0091R	20, 45, 100

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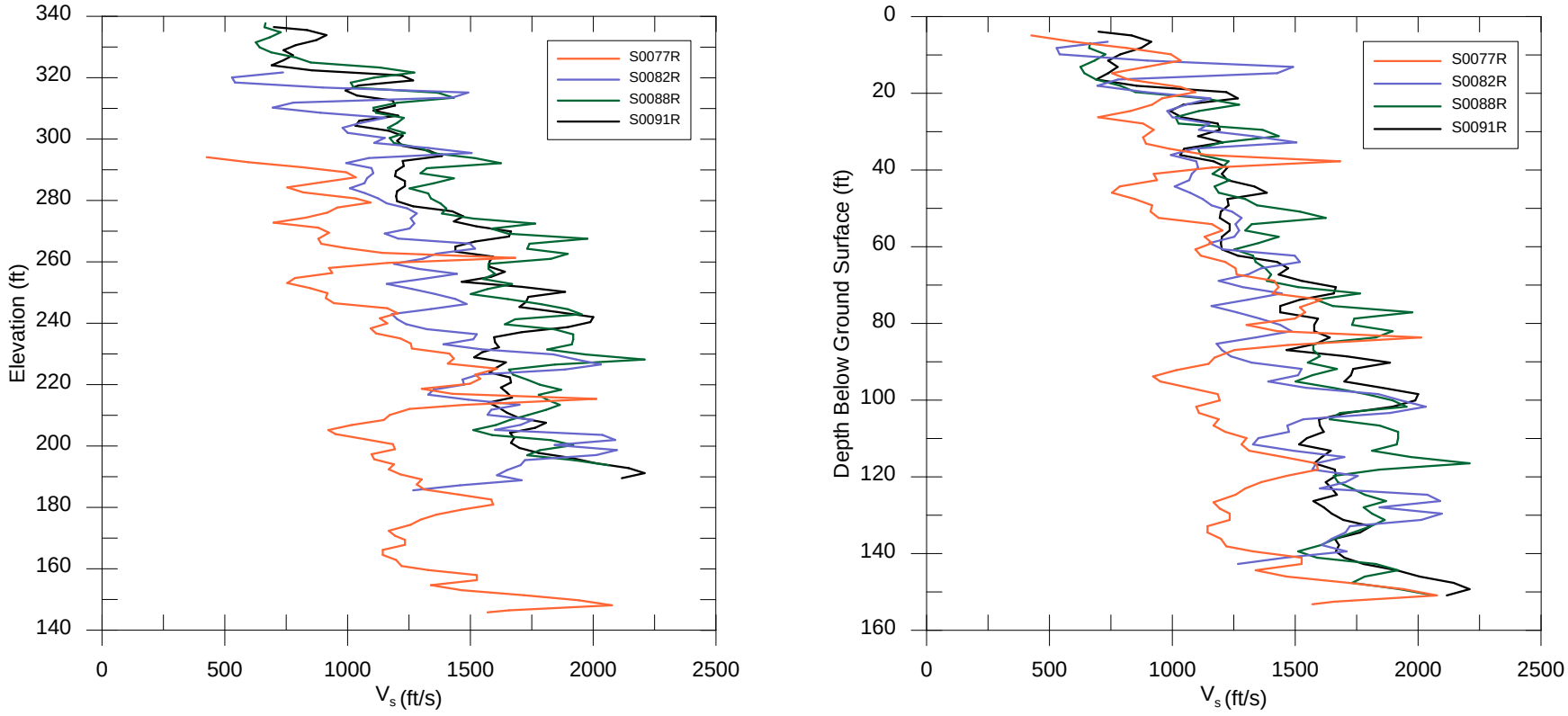


Figure 5.4-1
Shear Wave Velocity Profiles from PS Logging

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5.5 Observation Wells

Four standpipe piezometer observation wells were installed during the GI. During piezometer installation, the depths of the piezometer end cap, sand filter, bentonite seal, and grout, and the length of the slotted screen were recorded. Piezometer installation records are included in the borehole logs in Appendix B and summarized in Table 5.5-1.

Table 5.5-1
Standpipe Piezometer Installation Details

Piezometer ID	Date Installed	Northing, NAD83 (ft)	Easting, NAD83 (ft)	Elevation, NAVD88 (ft)	Well Screen Depth[a]		Sand Filter[b]	
					Top Depth (ft)	Bottom Depth (ft)	Top Depth (ft)	Bottom Depth (ft)
S0077R	11/11/1943	2,431,686	6,165,385	299.0	45	65	42	73
S0078R	11/11/2013	2,430,151	6,166,302	306.0	90	120	84	125
S0083R	11/11/2013	2,402,676	6,165,442	331.9	96	126	90	151.5
S0088AR	11/11/2013	2,365,234	6,188,715	346.1	120	150	115	151

[a] 2-inch-outer-diameter Schedule 40 PVC with 0.020-inch slotted screen.
[b] No. 3 Monterey sand.

5.5.1 Field Procedures

Standpipe piezometers were installed using the following standard procedures. A schematic standpipe piezometer installation is shown in Figure 5.5-1.

- Borehole filled with No. 3 filter sand to desired depth of piezometer end cap.
- 2-inch-outer-diameter Schedule 40 PVC solid flush-joint casing with 20-foot length of 0.020-inch slotted screen installed to depth of, at minimum, 2 feet above bentonite chip grout.
- No. 3 filter sand tremied into borehole to cover, at minimum, 2 feet above and below screened section of PVC casing.
- Bentonite pellet seal placed with, at minimum, 1 feet coverage over No. 3 filter sand pack.
- Remaining section of borehole backfilled with cement grout.
- Well box installed flush with ground surface.

Logs of each piezometer installation are included with the respective boring log in Appendix B.

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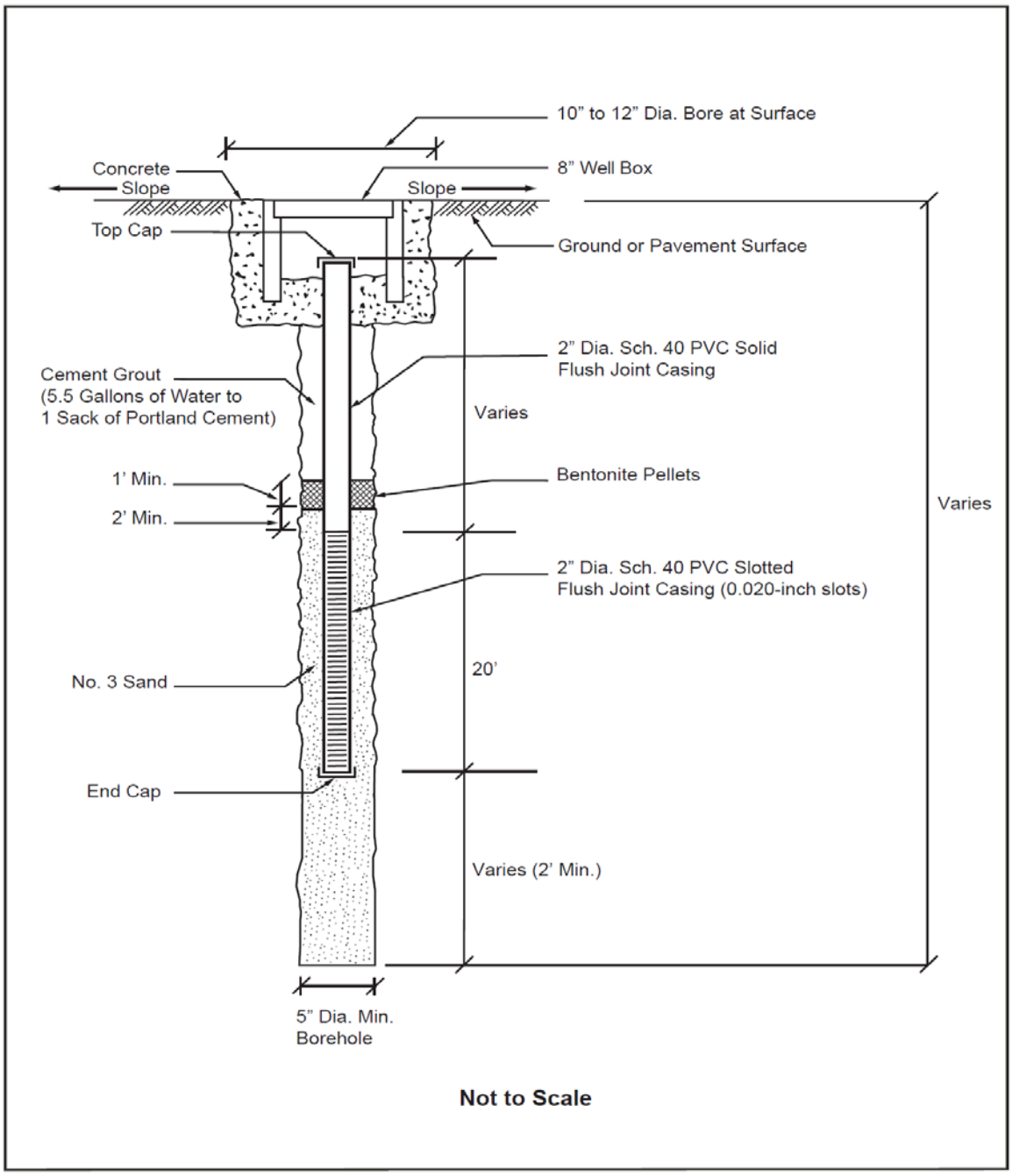


Figure 5.5-1
Schematic Standpipe Piezometer Installation

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Upon completion of piezometer installations, piezometers were developed in accordance with ASTM D 5521 standards. Piezometer development included bailing and mechanical surging to remove fine-grained materials and drilling fluids from the slotted screen, filter sand pack, and adjacent formation.

Gregg Drilling maintained records of the various operations performed during development, including the type of equipment used, approximate volume of water removed from the piezometers, and static water level before and after development. When possible, at least five well volumes of water were removed from each piezometer.

5.5.2 Frequency of Testing

Piezometers are monitored on an hourly basis with a data logger. The data are downloaded periodically. This monitoring is to help in understanding long-term groundwater behavior.

5.5.2.1 Results

Results from the groundwater monitoring program are presented in Table 5.5-2 and Figure 5.5-2. The well box elevation is relative to NAVD88.

Table 5.5-2
Groundwater Levels Measured in Standpipe Piezometers

Piezometer ID	S0077R[a]	S0078R	S0083R[b]	S0088AR[c]
Top of Well Box Elevation, NAVD88 (ft)	299.0	306.0	331.9	346.1
Date Read	**Measured Depth Groundwater (ft)**			
11/7/2013[d]	ND[e]	ND	ND	146.6
11/8/2013[d]	ND	dry	116	ND
1/11/2013	70.1	99.94	125.2	143.3
1/6/2014	70.1	ND	dry	dry
2/19/2014	ND	101.8	124.8	dry
4/16/2014	dry	ND	125.1	dry

[a] S0077R – likely dry; water tagged at 70.1 ft is likely trapped in silt trap and likely does not represent GW conditions. Datalogger is set at 60 ft and is currently dry.
[b] S0083R – GW may be present below the datalogger, which is set at 120 ft bgs and is currently dry.
[c] S0088AR – GW may be present below the datalogger, which is at a depth of 140 ft bgs and is currently dry.
[d] Measured prior to well development.
[e] ND signifies no data acquired from that location on that date.

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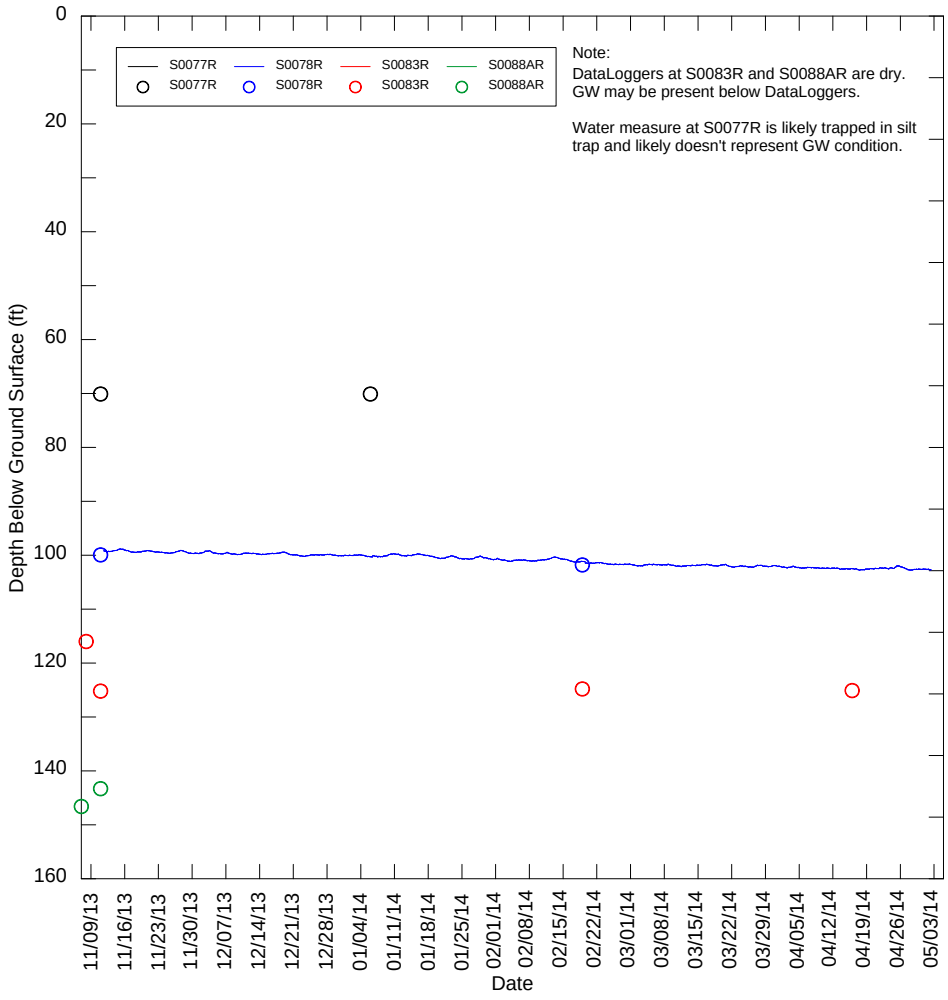


Figure 5.5-2
Groundwater Depths Measured in Standpipe Piezometers

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Section 6.0

Laboratory Testing

6.0 Laboratory Testing

A laboratory test program was completed to provide the necessary data to evaluate the physical and engineering characteristics of soils and groundwater encountered during the ground investigation.

Laboratory testing was performed by Inspection Services Inc. of Berkeley, California, and Technicon Consultants, of Fresno, California. Soil testing was performed in general accordance with the following ASTM standard test methods:

- ASTM D 422, "Standard Test Method for Particle-Size Analysis of Soils."
- ASTM D 1140, "Test Method for Amount of Material in Soils Finer than the No. 200 Sieve."
- ASTM D 1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))."
- ASTM D 1883, "Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils."
- ASTM D 2844 "Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils"
- ASTM D 2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock."
- ASTM D 2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils."
- ASTM D 3080, "Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions."
- ASTM D 4318, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils."
- ASTM D 4327, "Standard Test Method for Anions in Water by Chemically Suppressed Ion Chromatography."
- ASTM G 57, "Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method."

Additionally, groundwater chemistry testing was performed in accordance with the following US Environmental Protection Agency (EPA) and Standard Methods for the Examination of Water and Wastewater (SM) procedures:

- EPA 200.7, "Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Spectrometry."
- EPA 300.0, "Inorganic Anions by Ion Chromatography. Official Name: Determination of Inorganic Anions by Ion Chromatography."
- SM 2320B, "Alkalinity."
- SM 2510B, "Conductivity."
- SM 4500-H^+B, "pH Value."

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Laboratory test results are presented in the following sections. The complete test summary reports by Inspection Services, Inc. and Technicon Consultants are included in Appendix E.

6.1 Index Property Testing

Index property testing was performed to provide soil classifications and determine general engineering behavior. The information gathered from index tests may be used to assess the variability of soils and help refine the soil stratigraphy profile along the alignment.

Geotechnical index testing for the soil samples included dry density and moisture content, No. 200 sieve wash, hydrometer, grain-size analysis, Atterberg limit, and organic content tests. Table 6.1-1 presents the range of results obtained for each index test performed.

Table 6.1-1
Summary of Results from Index Property Tests

Test	Test Reference	No. of Tests	Range of Values[a]	Mean Value[b]	Standard Deviation
Moisture Content	ASTM D 2216	175	2.2 to 34.7%	14%	6%
Fines Content	ASTM D 1140	148	3.5 to 95%	44%	23%
Liquid Limit	ASTM D 4318	43	NP to 48%	31%	6%
Plastic Limit	ASTM D 4318	43	NP to 28%	18%	4%
Plasticity Index	ASTM D 4318	43	NP to 53	13	7
Organic Content	ASTM D 2974	0	–	–	–

[a] NP = non-plastic.
[b] NP values excluded for mean.

6.2 Direct Shear Testing

Direct shear tests were performed in accordance with ASTM D 3080 procedures in order to obtain effective-stress soil parameters from selected specimens.

A summary of direct shear test results are presented in Table 6.2-1.

Table 6.2-1
Summary of Results from Direct Shear Tests

Test	No. of Tests	Range of Values	Mean Value	Standard Deviation
Effective Cohesion	53	0 to 3,610 psf	868 psf	790 psf
Effective Friction Angle (deg)	53	21° to 42°	32°	5°

6.3 Compaction Testing

Compaction testing was performed on bulk samples obtained in the upper 5 to 10 feet of material to evaluate the compaction characteristics of soils that may be used as fills for embankments,

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retaining walls, and structural foundations. Increased compaction level generally leads to greater strength and stiffness, and lower settlement under anticipated loading conditions.

Compaction testing was performed using the modified Proctor test method. The modified Proctor test is used to determine the maximum bulk density to which a soil can be compacted given specified compaction energy. The test may be used to specify the compaction requirements for field control of earthworks.

Compaction test results are presented in Table 6.3-1.

Table 6.3-1
Summary of Results from Modified Proctor Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
Maximum Dry Unit Weight	ASTM D 1557	21	115.3 to 133.4 lb/ft^3	127 lb/ft^3	4 lb/ft^3
Optimum Moisture Content		21	6.5 to 14.3%	9%	2%

6.4 California Bearing Ratio

California Bearing Ratio (CBR) tests were also performed on bulk samples obtained in the upper 5 to 10 feet of material to evaluate its potential strength as a subgrade material. The CBR test measures the response of a compacted soil or aggregate to a bearing pressure. CBR values for each sample were determined at the optimum water content and maximum dry unit weight determined from Modified Proctor tests performed at the corresponding test locations.

Compaction test results are presented in Table 6.4-1.

Table 6.4-1
Summary of Results from California Bearing Ratio

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
CBR	ASTM D 1883	8	6 to 55	21	17

6.5 Resistance Value Testing

The RC performed resistance value (R-value) tests on bulk samples of material obtained in the upper 5 to 10 feet of the ground surface to evaluate soil strength as pavement subgrade material. In total, 18 R-value tests were performed on the material encountered and 3 of these tests were performed on material treated with 4% Quicklime Plus. The range of R-value results at 300 psi exudation pressure and the mean value and standard deviation are shown in Table 6.5-1.

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Table 6.5-1
Summary of Results from R-Value Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
R-Value, untreated	ASTM D 2844	18	5 to 68	35	22
R-Value, treated[a]	ASTM D 2844	1	84 to 84	84	–
[a] Treated with Quicklime Plus @4% by wet density (e.g., 4.8 lbs of lime for 120 lbs of wet soil)					

6.6 Expansion Index Testing

Bulk samples obtained in CP4 comprised sands and silty sands when categorized in the field. No expansion index testing was run on these materials.

6.7 Soil Corrosion Testing

Corrosion tests were performed on selected samples to evaluate the corrosion potential for buried iron, steel, mortar-coated steel, and reinforced concrete structures. Corrosion testing included pH level, minimum resistivity, and chloride and sulfate concentrations. Corrosion test results are presented in Table 6.7-1.

Table 6.7-1
Summary of Results from Soil Corrosion Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
Minimum Resistivity (ohm-cm)	ASTM G 57	5	1651 to 5112	3067	1460
pH	ASTM D 4327	5	7.05 to 8.6	8	1
Sulfate (ppm)	ASTM D 4327	4[a]	50 to 600	278	251
Chloride (ppm)	ASTM D 4327	4[a]	28 to 47	37	10
[a] One test result is pending at the time of report compilation.					

For structural elements, Caltrans Corrosion Guidelines (2003) consider a site to be corrosive if one or more of the following conditions exist for the representative soil and/or water samples taken at the site:

- Resistivity is 1,000 ohm-cm or less.
- Chloride concentration is 500 parts per million or greater.
- Sulfate concentration is 2,000 parts per million or greater.
- pH is 5.5 or less.

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6.8 Triaxial Compression Testing

Triaxial unconsolidated undrained compression (TXUU) and triaxial consolidated drained compression (TXCD) tests were performed to determine soil strength parameters. The RC conducted 27 TXUU tests in accordance with ASTM D2850 and 18 TXCD tests in accordance with USACE. Of the 18 TXCD tests, 13 were two stage tests. The results are summarized in Table 6.8-1 and Table 6.8-2. Full results of the tests are included in Appendix E.

Table 6.8-1
Summary of Undrained Shear Strength from TXUU Tests

Test	Test Reference	No. of Tests	Cohesion (psf)	Mean Value (psf)	Standard Deviation (psf)
TXUU	ASTM D2850	27	1011 to 10440	3645	2351

Table 6.8-2
Summary of Effective Stress Friction Angles from TXUU and TXCD Tests

Test	Test Reference	No. of Tests	Range of Effective Stress Friction Angles (°)	Mean Value (°)	Standard Deviation (°)
TXCD @ 5% Strain	USACE	18	18 to 40	33	5
TXCD @ 15% Strain	USACE	13	21 to 36	33	4

The notably low results of 18º and 21º came from a sample in boring S0078R.

6.9 Consolidation Testing

Consolidation tests and specific gravity tests were not run for on samples obtained in CP4. No samples exhibited characteristics of soft, saturated, or compressible fine-grained material.

6.10 Groundwater Chemistry Testing

Two indices are useful to predict the potential for corrosion or scale formation of water:

- **Langlier Saturation Index** – The Langlier Index predicts the scaling of water based on the calcium carbonate equilibrium values. If the actual pH of water is below the calculated pH, the Langlier Index is negative, indicating that the water will dissolve calcium carbonate and that it will be corrosive, particularly if dissolved oxygen is present. If the actual pH of water is higher than the calculated pH, the Langlier Index is positive, indicating that incrustants (i.e., scaling) will likely occur.
- **Ryznar Stability Index** – The Ryznar Index predicts the tendency for scaling and corrosion. It is widely used to predict the reaction of metal in saturated subsurface conditions. Water is corrosive if the index is higher than 7 and incrusting if it is less than 7.

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The Rothberg, Tamburini & Winsor, Inc. Corrosivity Index Calculator (AWWA 2011) can be used to calculate both the Langlier and Ryznar Indices. Each may be independently used to determine the corrosive nature of a given influent water. At the time of writing this draft report, no groundwater chemistry testing has been completed. The results of groundwater testing for corrosivity conducted for this investigation will be included when completed.

Groundwater sampling will be conducted in the installed standpipe piezometers to obtain samplers for water chemistry tests. The analytical results may be used to determine the Langelier Saturation and Ryznar Stability Indices. Groundwater chemistry test results will be presented in Table 6.10-1.

Table 6.10-1
Summary of Results from Groundwater Chemistry Tests

Test	Test Reference	Borehole ID			
		S077R	S078R	S0083R	S0088AR
pH	SM 4500-H^+B	Dry	9.6	Dry	Dry
Calcium (mg/L)	EPA 200.7		5.6		
Bicarbonate Alkalinity as $CaCO_3$ (mg/L)	SM 2320B		72		
Specific Conductance (µmhos/cm)	SM 2510B		284		
Total Dissolved Solids (mg/L)	SM2320B		177		
Chloride (mg/L)	EPA300.0		20.6		
Sulfate as SO_4 (mg/L)	EPA300.0		25.3		

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Section 7.0

Surface and Subsurface Conditions along Alignment

7.0 Surface and Subsurface Conditions along Alignment

7.1 Surface Conditions and Physical Setting

The CP4 alignment corridor spans from one mile north of the border between Tulare and Kern Counties to the intersection of Santa Fe Way with 7th Standard Road in Kern County. The alignment travels through rural agricultural lands with intermittent zones of light industrial and suburban development. The alignment passes directly through the towns of Wasco and Shafter.

The alignment crosses three watercourses and includes elevated viaducts, retained earth embankment, and at-grade structures. Several roadways will be re-routed over the alignment on overcrossings.

A gentle slope of the vast alluvial fans extends from the Sierra Nevada in the east to the center of the SJV. The ground level along the CP4 study area is relatively flat, with a general increasing elevation moving south along the alignment. Ground surface elevations measured at exploration locations range from about 230 to about 347 feet (NAVD88).

7.2 Generalized Subsurface Conditions

Surficial geology along the alignment shown in Figure 2.2-3 shows depositional environments consistent with alluvial fans such as basin deposits and fan deposits. Additionally, the explorations encountered existing fill deposits. At depth in the northerly end of alignment A1, CPTs encountered soils similar to lacustrine deposits. The units described herein follow the geological symbology on Figure 2.2-3, Qb (basin deposits), Qf (fan deposits), Qc (Pleistocene nonmarine deposits), and Ql (lacustrine deposits).

The following sections describe the subsurface ground conditions encountered, including groundwater conditions and evidence of soil contamination.

7.2.1 Existing Fill

Existing Fill encountered during the GI varied from 1.5 to 8 feet in thickness. Existing Fill consists of silty sand (SM) and clayey sand (SC), and contains varying amounts of fine gravel.

Historical records describing how Existing Fill was placed and compacted were not found during our investigation. The largest Existing Fill fragment encountered during the investigation was less than 1 inch in greatest dimension. However, the nature of drilling and sampling methods used and borehole spacing makes it difficult to quantify the maximum size of fragments in Existing Fill.

Existing Fill included surface pavements consisting of asphalt concrete, concrete, and aggregate base.

Laboratory tests performed on Existing Fill soils were geared towards index property determination and tests that support earthwork design because the bulk samples collected were highly disturbed and were taken from drilling cuttings. Laboratory tests performed included Modified Proctor Compaction, CBR, moisture content, fines content, Atterberg Limits, R-Value, resistivity, and dry density.

7.2.2 Quaternary Alluvial Fan Deposit

Alluvial Fan (Qb, Qf, Qc) was encountered beneath Existing Fill to the maximum depth explored. It consists of interbedded layers of poorly graded sand and silt, with varying amounts of coarse

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and fine grained particles. Interlayers of this unit are classified as poorly graded sand (SP), sand with silt (SP-SM), silty sand (SM), clayey sand (SC), clay (CL), silty clay (CL-ML), sandy silt (ML), silt with sand (ML) and silt (ML).

The CPTs did not meet refusal on shallow, hardpan or otherwise indurated materials. Had the CPTs met refusal shallower than 35 feet, solid-flight auger would have been used to penetrate the hard layers and the push would have been continued.

The results of geophysical testing (suspension velocity measurements) in boreholes S0077R, S0082R, S0088R, and S0091R indicate thin cemented layers are centered at various depths. These thin layers are represented by P- and S_H-wave velocity spikes shown in Figure 5.4-1, Table 1.2-1, and in Appendix D.

7.2.3 Lacustrine Deposits

Lacustrine deposits (Ql) were encountered primarily in Tulare County in CP2-3. Some CPTs at the northerly extent of CP4 show results indicating clay profiles consistent with the lacustrine deposits, but no boreholes were drilled nearby. CPTs indicating clayey profiles include S0243CPT, S0246CPT, S0248CPT, and S0249CPT.

A histogram of Normalized CPT Soil Behavior Type (SBT_N) distributions in CP4 is shown in Figure 7.2-2. The SBT_N classification (Robertson 1990) may be used as a guide to predict soil behavior based on cone penetration resistance and sleeve friction. A histogram of USCS distributions in CP4 is shown in Figure 7.2-1.

Hardpan soils requiring that CPTs be pre-drilled were not encountered in Tulare or Kern County; however subsurface geophysics performed in some borings indicated cemented layers, as described in Section 5.4.

A cross-section profile of the subsurface stratigraphy is presented in Figure 7.2-5 through Figure 7.2-14.

7.2.4 Distribution of Soil Types

A histogram of USCS soil types encountered in CP4 borings is shown in Figure 7.2-1.

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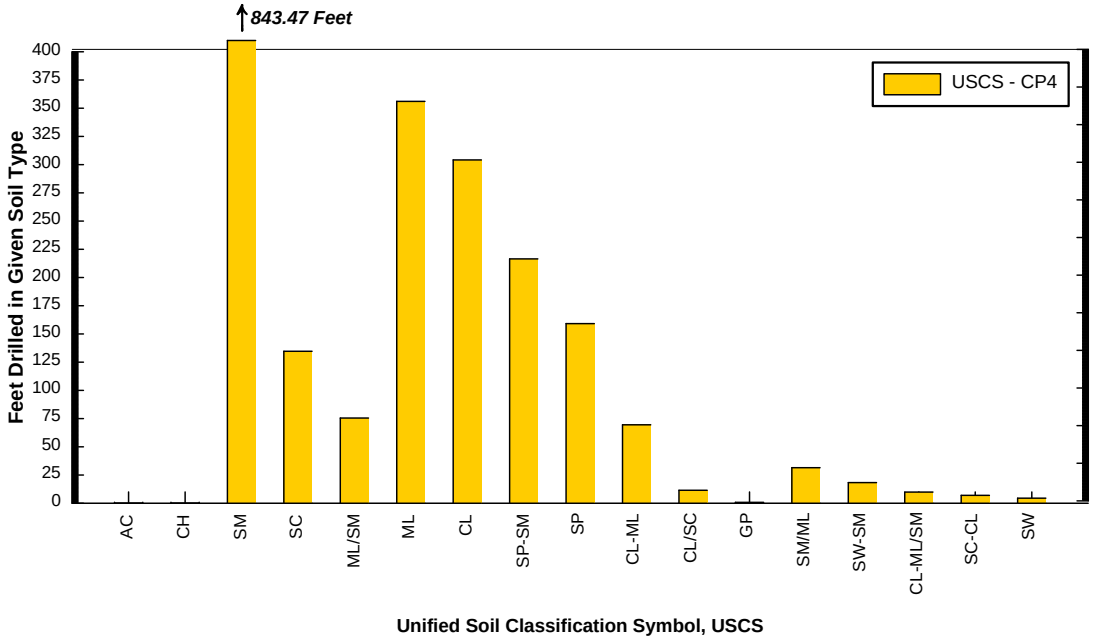


Figure 7.2-1
Unified Soil Classification System (USCS) Distribution in CP4

A histogram of normalized CPT soil behavior type (SBT_N) distributions in CP4 is shown in Figure 7.2-2. The SBT_N classification was unified by Robertson (2010) with earlier SBT numbering from Robertson (1990) and may be used as a guide to predict soil behavior based on cone penetration resistance and sleeve friction.

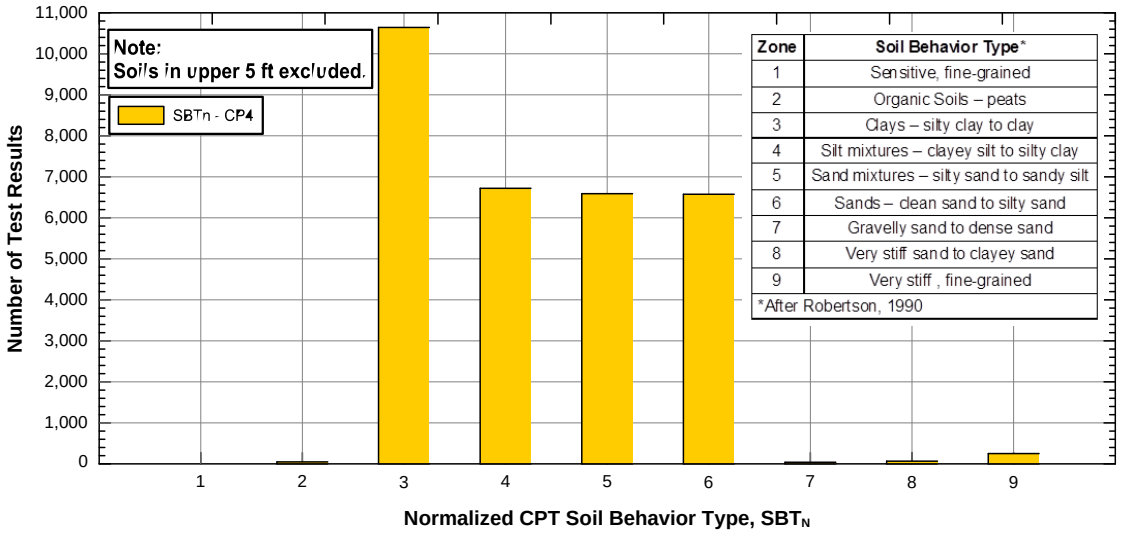


Figure 7.2-2
Normalized CPT Soil Behavior Type (SBT_N) Distribution for Alluvial Fan

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7.2.5 Distribution of N-Values

A profile of SPT N-values and California Modified N-values measured in CP4 borehole is presented in Figure 7.2-3. The values shown in have not been corrected for energy and field procedures; however, the California modified blow counts have been corrected for sampler size. Uncorrected SPT N-values range from 6 to greater than 100 blows (i.e., sampler refusal) and generally increase with depth.

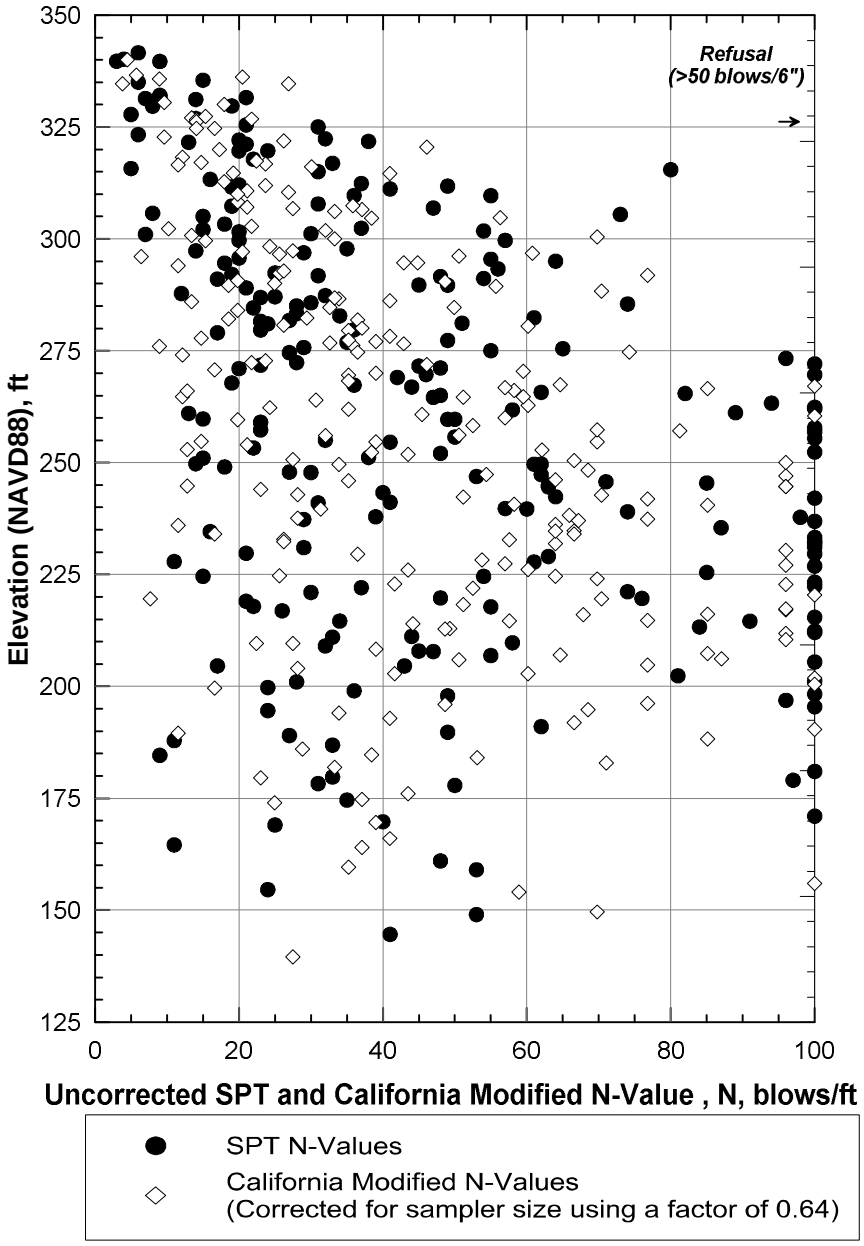


Figure 7.2-3
CP4: Profile of N-Values Versus Elevation

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Because of the elevation difference, further interpretation of blowcount trends with depth may be possible. Figure 7.2-4 shows the N-values and the increasing trend versus depth.

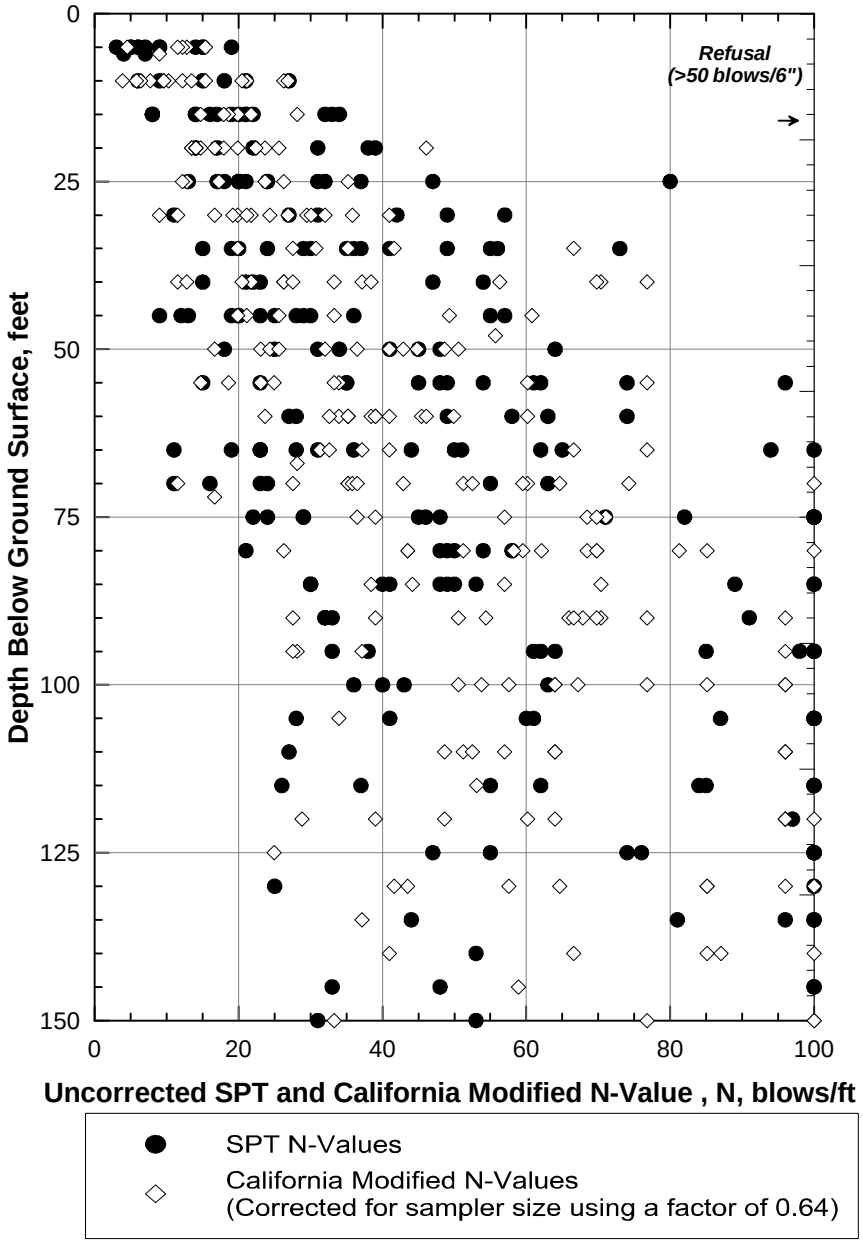
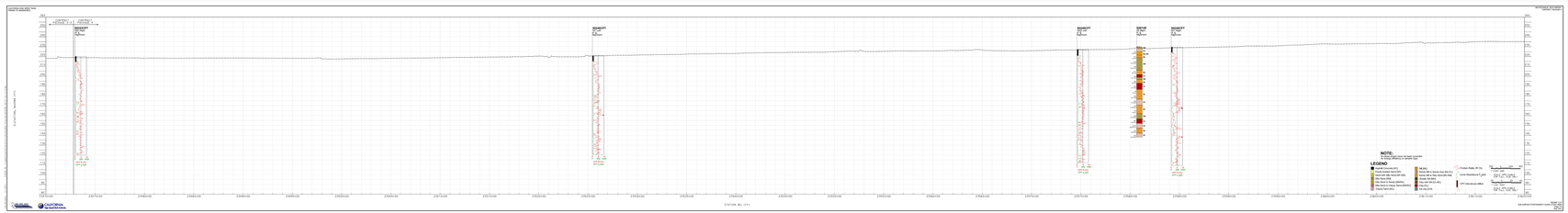


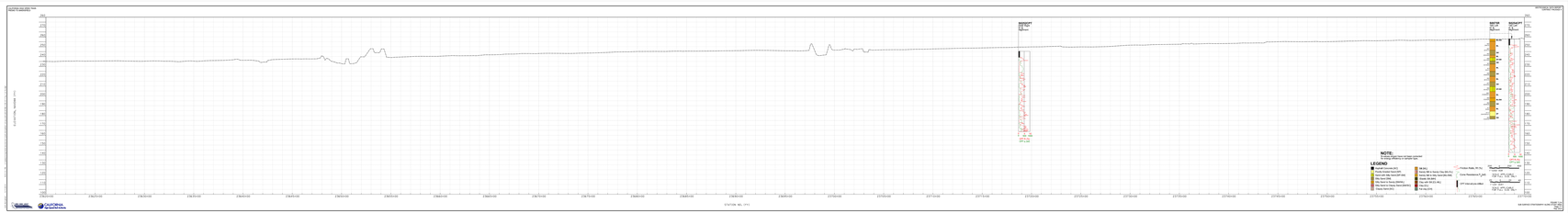
Figure 7.2-4
CP4: Profile of N-Values Versus Depth

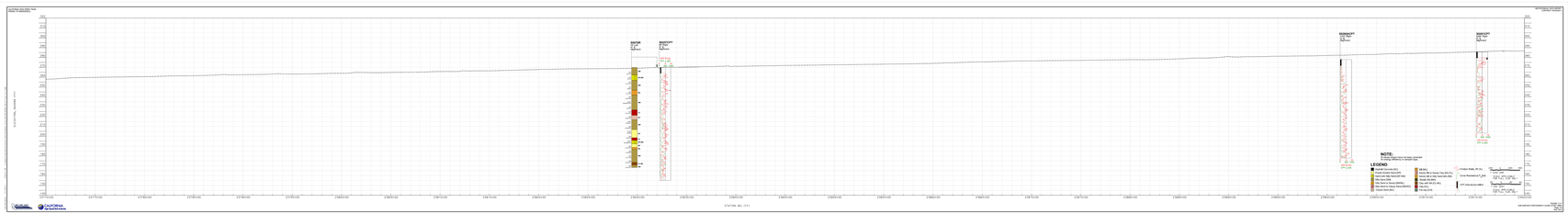
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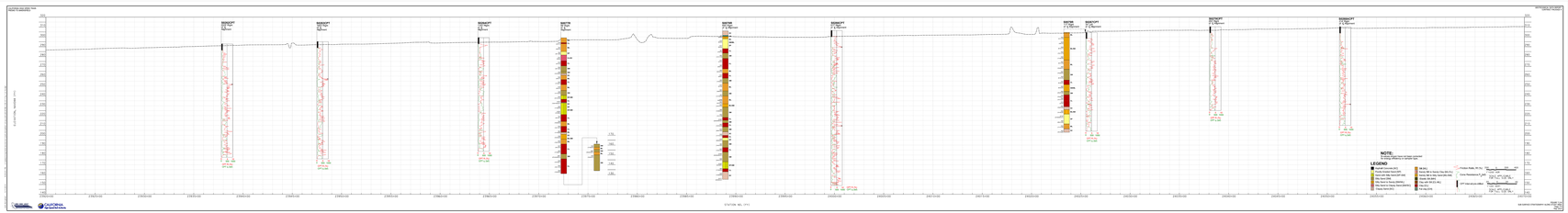
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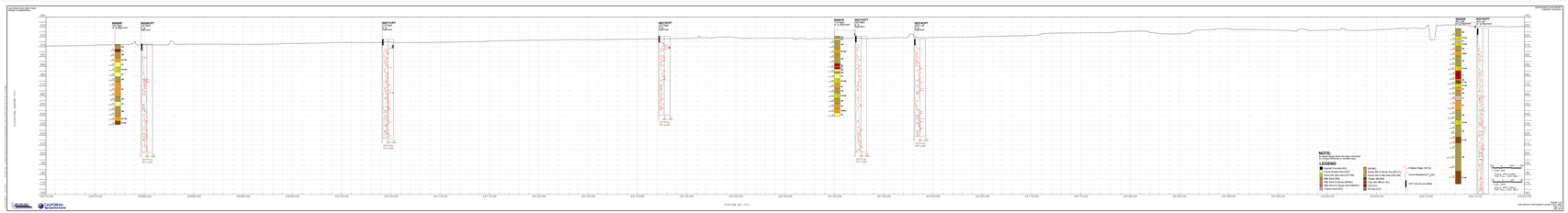
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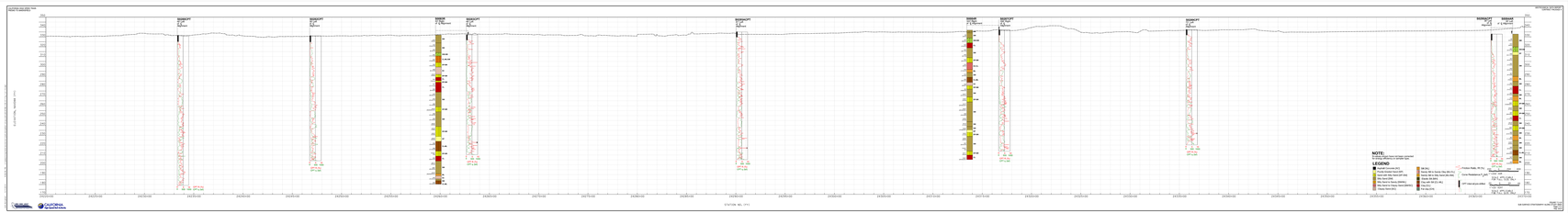

SIGNOFF
SIGNOFF
SIGNOFF
SIGNOFF
SIGNOFF
NOTE:
LEGEND
STATION, MILE POST
ELEVATION (Horizontal Scale 1" = 100')

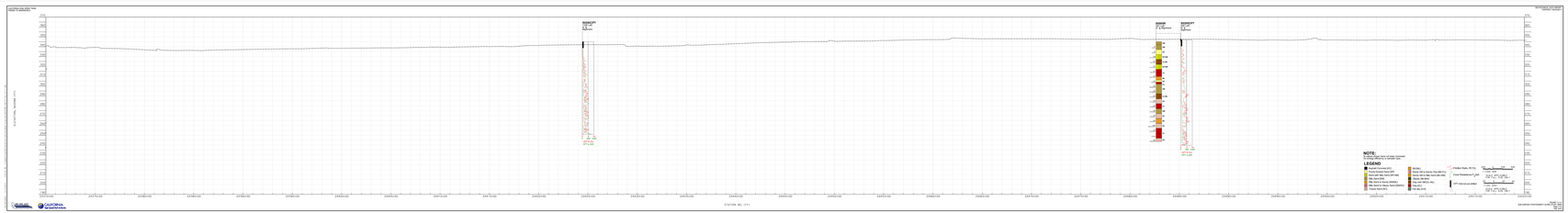

NOTE:
Refer to project plans for a more complete description of the utilities in the work area.
LEGEND
Asphalt Concrete (AC)
Aggregate Base (Class 2 AB)
Sand over Silty Sand (SP-SM)
Silty Sand (SM)
Silty Sand to Sandy Silt (SM-ML)
Sandy Silt to Silty Sand (ML-SM)
Clayey Sand (SC)
SB-01
Sandy Silt to Sandy Clay (ML-CL)
Sandy Silt to Clay Sand (ML-SM)
Gravel (GP-GM)
Clayey Sand to Sandy Clay (SC-CL)
Fill (Qaf)
Fresno Public, Pl. 71
Fresno Nonmetropolitan, Pl. 72
CPT interval (as offset)
Boring Date: 07/19/2021
Logged By: J. Hall
Boring Date: 07/19/2021
Logged By: J. Hall
STATION, MD, YYYY
VERTICAL EXAGGERATION 10:1
Sheet 1 of 2
Full-scale Horizontal Scale 1" = 50'

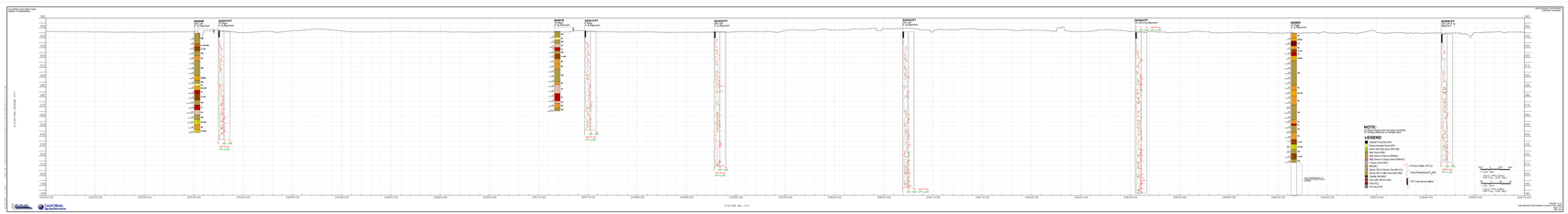

SR91/91 EXPRESS LANES PROJECT
PROFILE ALONG EB 91
SR91/91 EXPRESS LANES PROJECT
PROFILE ALONG WB 91
EB 91
WB 91
EB 91 to Norco Exp (Rt 2)
Norco SB to Hwy 91/I-15 NB
Hwy 91 SB (Rt 1)
Hwy 91 SB (Rt 2 to Rt 1)
Hwy 91 NB (Rt 1)
Hwy 91 NB (Rt 2)
Asphalt Concrete (AC)
Rubberized Asphalt Concrete (RAC)
Gravel with Silty Sand (GP-SM)
Silty Sand (SM)
Silty Sand to Sandy Silt(SM-ML)
Sandy Silt to Silty Sand (ML-SM/SM)
Sandy Silt (ML)
Poorly Graded Silt (ML-CL)
Lean Clay (CL)
Poorly Graded Silt (ML-CL)
Cross Passageway Cut/Fill
Cut/Fill
Cut/Fill

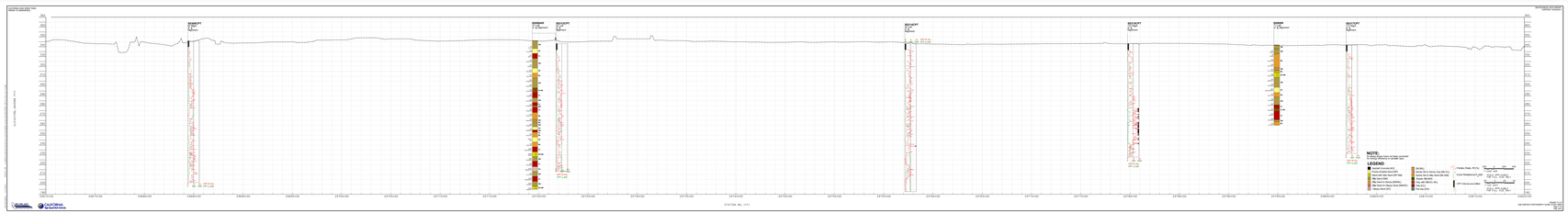

SOUTHBOUND
NORTHBOUND
SB/NB
SOUTHBOUND
NORTHBOUND
SB/NB
SOUTHBOUND
NORTHBOUND
SB/NB

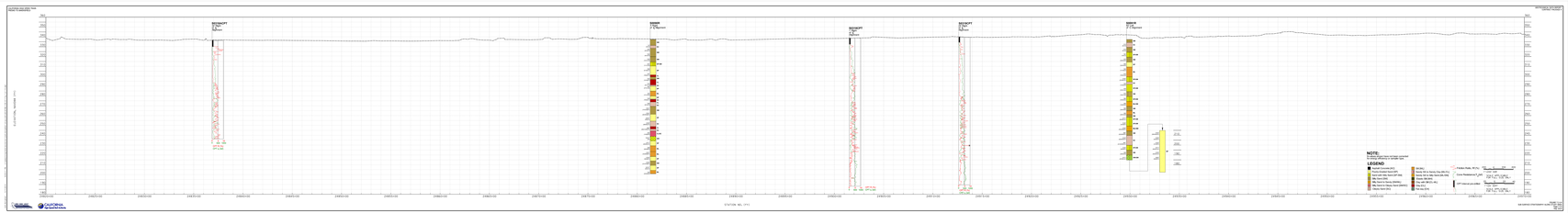

SB008
SB007
SB006
SB005
SB004
SB003
SB002
SB001
NOTE:
LEGEND
Asphalt Concrete (AC)
Sandy Silt to Silty Sand (ML-SM)
Sandy Silt to Clay Sand (ML-SC)
Silty Sand to Sandy Silt (SM-ML)
Silty Sand to Clay Sand (SM-SC)
Clay to Sandy Clay (CL)
Fat Clay (CH)
Fill (Unknown)
Clay Sand to Sandy Clay (SC-CL)
Sandy Silt to Clay Sand (ML-SC)
Clayey Silt (MH)
Sandy Silt (ML)
Fat Clay to Clayey Silt (CH-MH)
Fill (Clay) (FC)
Fat Clay Public, RE (FL)
Cone Resistance (qc) (tsf)
Soil Interval (and Offset)
STATION, MD, YYYY
ELEVATION (MSL) FEET
SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company
SCALE: 1:1
1/4 INCH EQUALS 1 FOOT
DRAWING NUMBER
SHEET 1 OF 1


NOTE:
Refer to Plan for more detailed information regarding the ground conditions.
LEGEND
Backfill Concrete (BC)
Very Stiff to Hard Clay (VSt-H)
Very Stiff to Very Hard Clay (VSt-VH)
Clay Gravel (CG)
Very Dense Sand (VD)
Very Dense Sand and Gravel (VDSG)
Clay Cobbles (CC)
Mudstone (M)
Very Stiff to Hard Clay (M-H)
Clay Mudstone (CM)
Sandstone (S)
Clay Shale (CS)
Piezometer
Core Photo
Core Photo
Piezometer
Piezometer
Piezometer


NORCP
CL 1
Ballast
NORSP
CL 1 Ballast
NORCP
CL 1
Ballast
NOTE:
Refer to Geotechnical Data Report for full logs completed for this project and for complete soil key.
LEGEND
Topsoil Concrete (SC)
Clay, Low Plasticity (CL)
Clay, Low-Mid Plasticity (CL-CI)
Clay, Mid-Plasticity (CI)
Clay, Mid-High Plasticity (CI/MH)
Clay, High Plasticity (CH)
Fat Clay (CH)
Silt (ML)
Silty Clay, Low Plasticity (CL-ML)
Sandy Silty Clay (SC-SM)
Gravelly Silty Clay (GC-GM)
Silty Sand (SM)
Poorly Graded Sand (SP)
Fill
Poorly Graded Gravel (GP)
Fines Content, FC (%)
Plasticity Index, PI (%)
Cone Resistance, qc (MPa)
CPT borehole
CPT borehole with pore pressure dissipation test
CPT test at pre-drilled
Soil Behavior Type Index, Ic
Ic < 1.31 Gravelly Sand to Dense Sand
1.31 < Ic < 2.05 Clayey Sand to Silty Sand
2.05 < Ic < 2.60 Silty Sand to Sandy Silt
2.60 < Ic < 2.95 Clayey Silt to Silty Clay
2.95 < Ic < 3.60 Silty Clay to Clay
Ic > 3.60 Clay
Soil Behavior Type and Undrained Shear Strength Index, Ic
Ic < 1.31 Gravelly Sand to Dense Sand
1.31 < Ic < 2.05 Clayey Sand to Silty Sand
2.05 < Ic < 2.60 Silty Sand to Sandy Silt
2.60 < Ic < 2.95 Clayey Silt to Silty Clay
2.95 < Ic < 3.60 Silty Clay to Clay
Ic > 3.60 Clay
Undrained Shear Strength, Su (kPa)
Su < 25 kPa
25 kPa < Su < 50 kPa
50 kPa < Su < 75 kPa
75 kPa < Su < 100 kPa
Su > 100 kPa
STATION, KM, CP11
ELEVATION (AHD) (m)
Page 11 of 12
Full version of horizontal scale 1:2000 @ A1
Full version of vertical scale 1:200 @ A1


SB06B
SB06SPT
SB07
SB07SPT
SB08
SB08SPT
SB09
SB09SPT
SB10
SB10SPT
SB11
SB11SPT
NOTE:
LEGEND
Alluvial Concrete (AC)
Alluvial Sand (SW, SP)
Alluvial Silty Sand (SM)
Alluvial Clay (CL)
Silty Sand to Sandy Silt(SM/ML)
Silty Sand to Sandy Clay(SM/SC)
Clayey Sand (SC)
Sandy Silt to Silty Sand (ML/SM)
Sandy Clay to Clayey Sand (CL/SC)
Sandy Silt (ML)
Clay (with SM) (CL/ML)
Clay (CL)
Clay to Lean Clay
Friction Ratio, Rf (%)
Cone Resistance, q_c (tsf)
SPT Interval not drilled
Cone Penetration Test
Sand Behavior Type
Soil Behavior Type
Standard Penetration Test
Blow Count (Blows/ft)
Soil Behavior Type
STATION NO. 1711
ALIGNMENT: BRIDGE TRUNK
VERTICAL EXAGGERATION: 5X
SHEET 1 OF 2


SCHOOLEY
Ex Well
Ex Bore
SCHOOLEY
Ex Well
Ex Bore
SCHOOLEY
Ex Well
Ex Bore


BOREHOLE
B-101
Ref. Level
BOREHOLE
B-102
Ref. Level
BOREHOLE
B-103
Ref. Level
BOREHOLE
B-104
Ref. Level
NOTE:
Refer to individual borehole log for detailed description and stratification.
LEGEND:
Asphalt Concrete (AC)
Fill Material (Sandy Silt)
Fill Material (Silty Sand with Rock)
Silty Sand (SM)
Silty Sand to Clayey (SM/SC)
Clayey Sand to Sandy Clay (SC/CL)
Silty Clay to Clayey Silt (CL/ML)
Silty Sand (SM)
Clayey Sand to Sandy Clay (SC/CL)
Clayey Silt (ML)
Silty Clay (CL)
Fill Material (Silty Clay)
Poorly Graded Gravel (GP)
Silty Clay to Clayey Silt (CL/ML)
Clayey Sand to Sandy Clay (SC/CL

7.2.6 Contaminated Soil

The geotechnical investigation performed for CP4 did not include desktop study or an environmental assessment of current or former hazardous substance cleanup sites, existing underground storage tanks, landfills, or other nearby sites that could impact soil and groundwater along the proposed alignment.

During the exploration campaign, evidence of possible soil or groundwater contamination (odor, discoloration) was not noted in the boreholes or CPTs completed. However, current and historical land use in the vicinity indicates man-made hazardous materials may be present in soil and groundwater along the proposed alignments. Hazardous materials associated with man-made contamination can include petroleum hydrocarbons, volatile organic compounds, semivolatile organic compounds, pesticides, PCBs, and metals. These contaminants are usually associated with current and former agricultural, industrial, and/or commercial activities. Aerially deposited lead is common in soil along shoulders of major thoroughfares from past leaded fuel vehicle emissions.

Railroads have historically used lead arsenate or other arsenic compounds as pesticide and herbicide, as well as using chlorinated pesticides. Lead may also be present as lead-based paint debris or as aerially-deposited lead. PCBs were historically used in railroad electrical equipment.

7.2.7 Groundwater Conditions

Monitoring of groundwater conditions was conducted in four standpipe piezometers installed during the GI. Groundwater-level measurements were generally not performed in boreholes during drilling due to the use of drilling fluid.

Results from piezometer measurements indicate the groundwater table is below 70 feet bgs in borehole S0077R, approximately 100 feet in S0078R, below 120 feet in S0083R, and below 140 feet in S0088AR. The results of piezometer measurements are presented in Table 5.5-2 and Figure 5.5-2. To date, groundwater levels measured in standpipe piezometers have not been subject to significant seasonal fluctuation.

Historical groundwater measurements along the alignment have been presented in Table 4.3-1. Groundwater observations from several CPTs have been presented in Table 5.2-2.

7.2.7.1 Perched Groundwater

Shallow perched groundwater conditions were not identified in the explorations in CP4. Results of geophysical testing indicated indurated or cemented soils at depth upon which thin layers of perched groundwater had created saturated conditions. In boring S0088R, saturated conditions were encountered between 120 and 128 feet, and again between 140 and 148 feet bgs.

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Section 8.0

Limitations and Further Information

8.0 Limitations and Further Information

The RC warrants that its services were performed within the limits prescribed by our client for the project, in a manner consistent with the level of care and skill ordinarily exercised by members of the same profession currently practicing in the same locality under similar circumstances. No other warranty or representation, either expressed or implied, is included or intended hereunder.

This report contains results of a preliminary geotechnical study to support development of the project. The geotechnical data presented in this report were collected based on the indicated project criteria and are intended only for the purposes, site location, and project described in this report. Conclusions drawn from the data presented herein are subject to change based on (1) future explorations to be performed by the Contractor, (2) when additional information on subsurface conditions becomes publicly available, and/or (3) key features of the project are changed during design.

The RC cannot be held responsible for interpretations, professional opinions, or advice given by others with regard to any geotechnical data presented in this report.

Additional explorations and/or analyses will be required to develop and prepare the GBR for Construction, which provides the basis for final design and construction. A geotechnical study for the project should reassess the geotechnical considerations and preliminary criteria presented in this report, and include additional geotechnical explorations, laboratory testing, and engineering analyses deemed necessary by the design-build contractor's geotechnical engineer of record to provide geotechnical design parameters for the final design of the proposed structures.

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Section 9.0

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9.0 References

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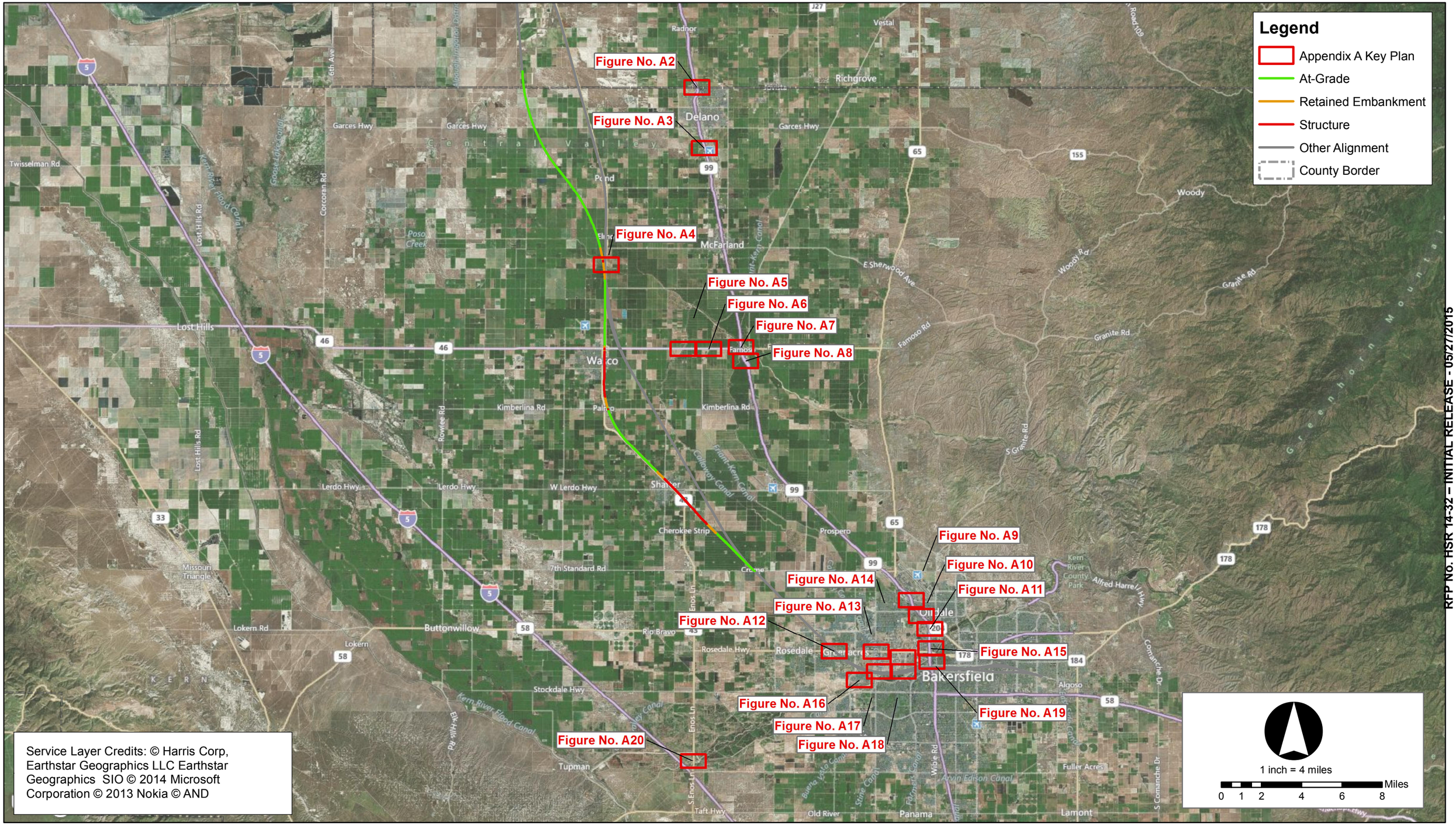
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Appendix A

Available Geotechnical Data from Previous Investigations

For gINT Database, see CD

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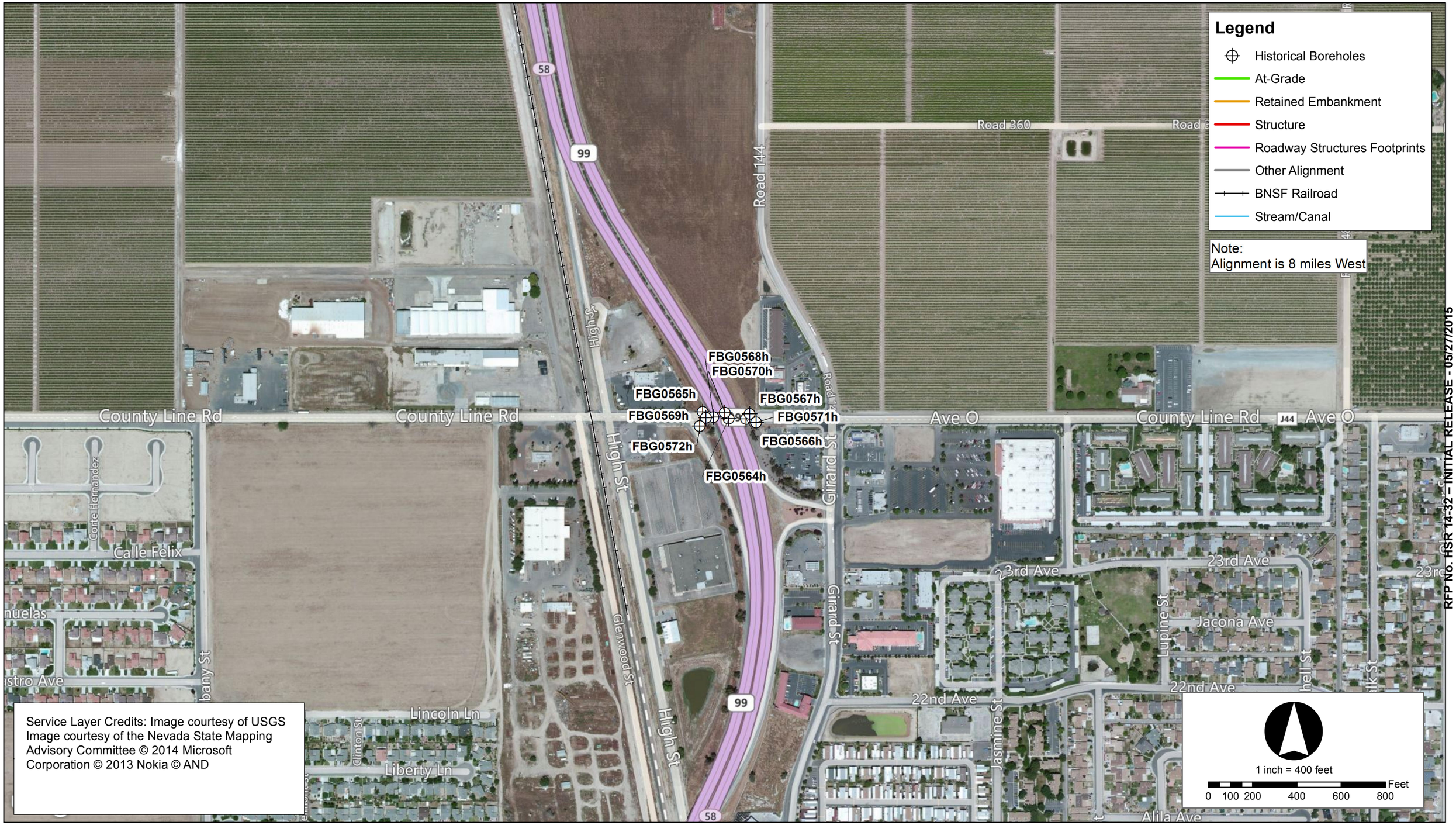
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URS | HMM | ARUP

CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA High-Speed Rail Authority

AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. A1
May 2014



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URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. A2
May 2014

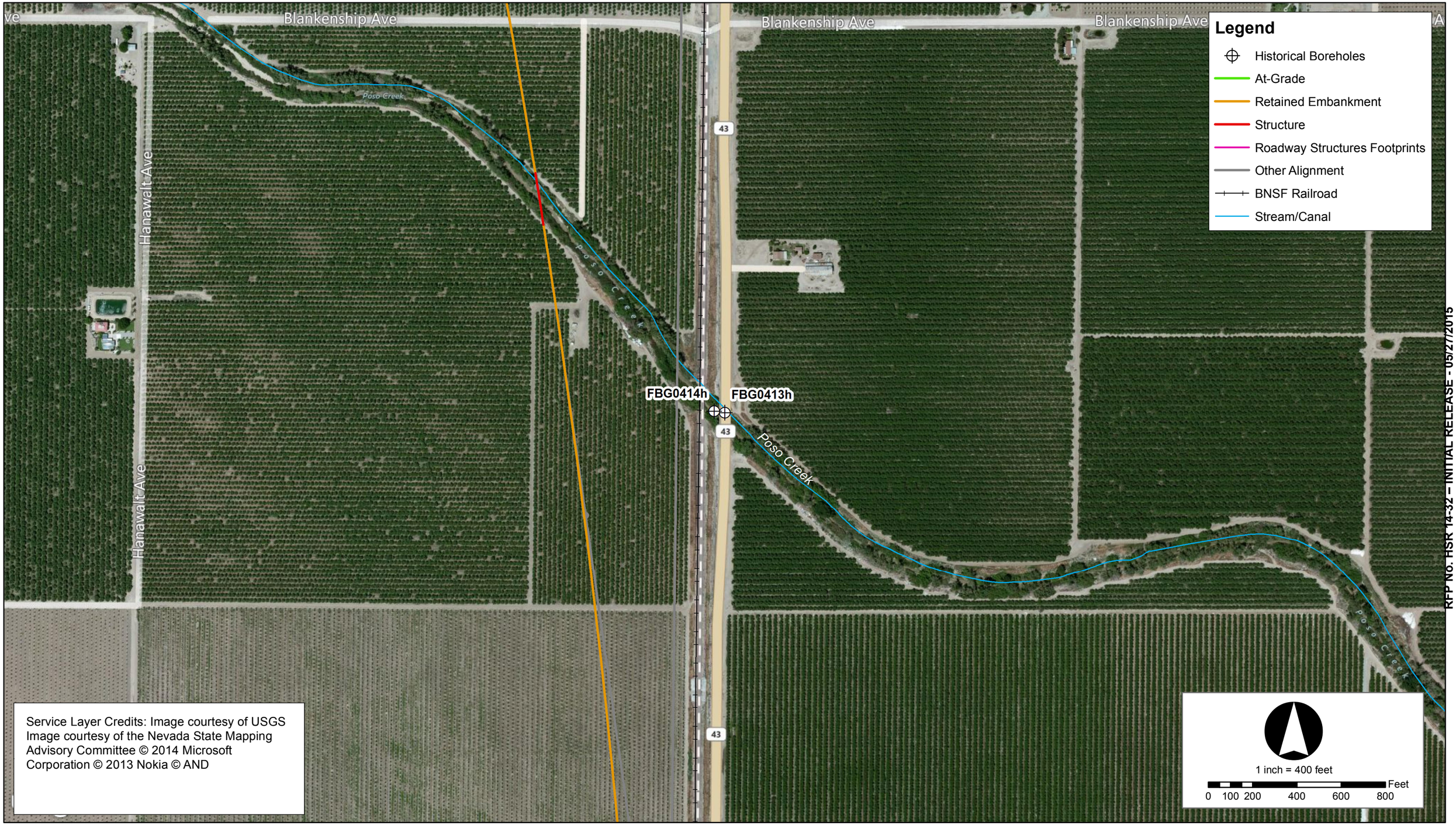


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URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
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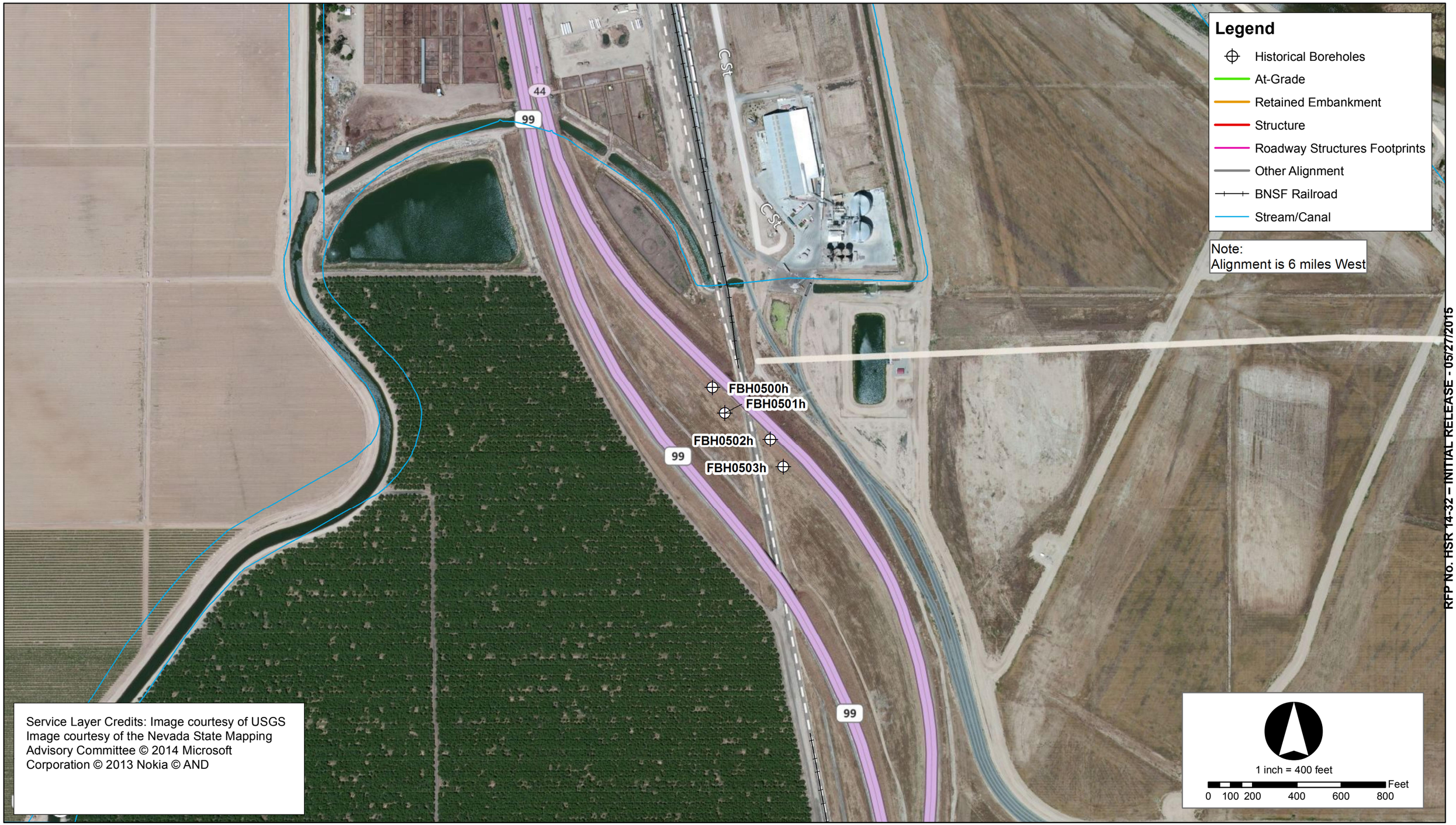


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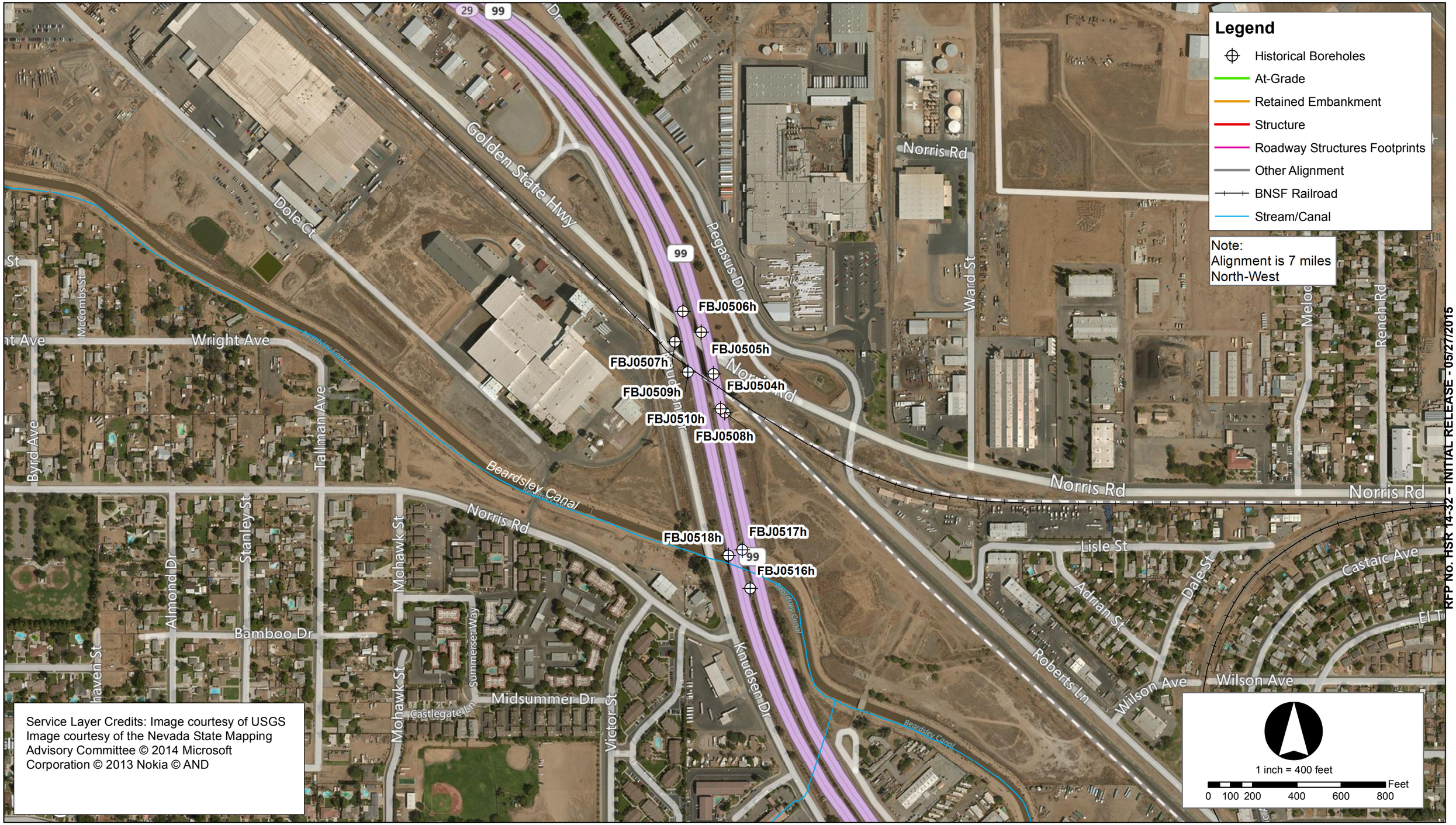


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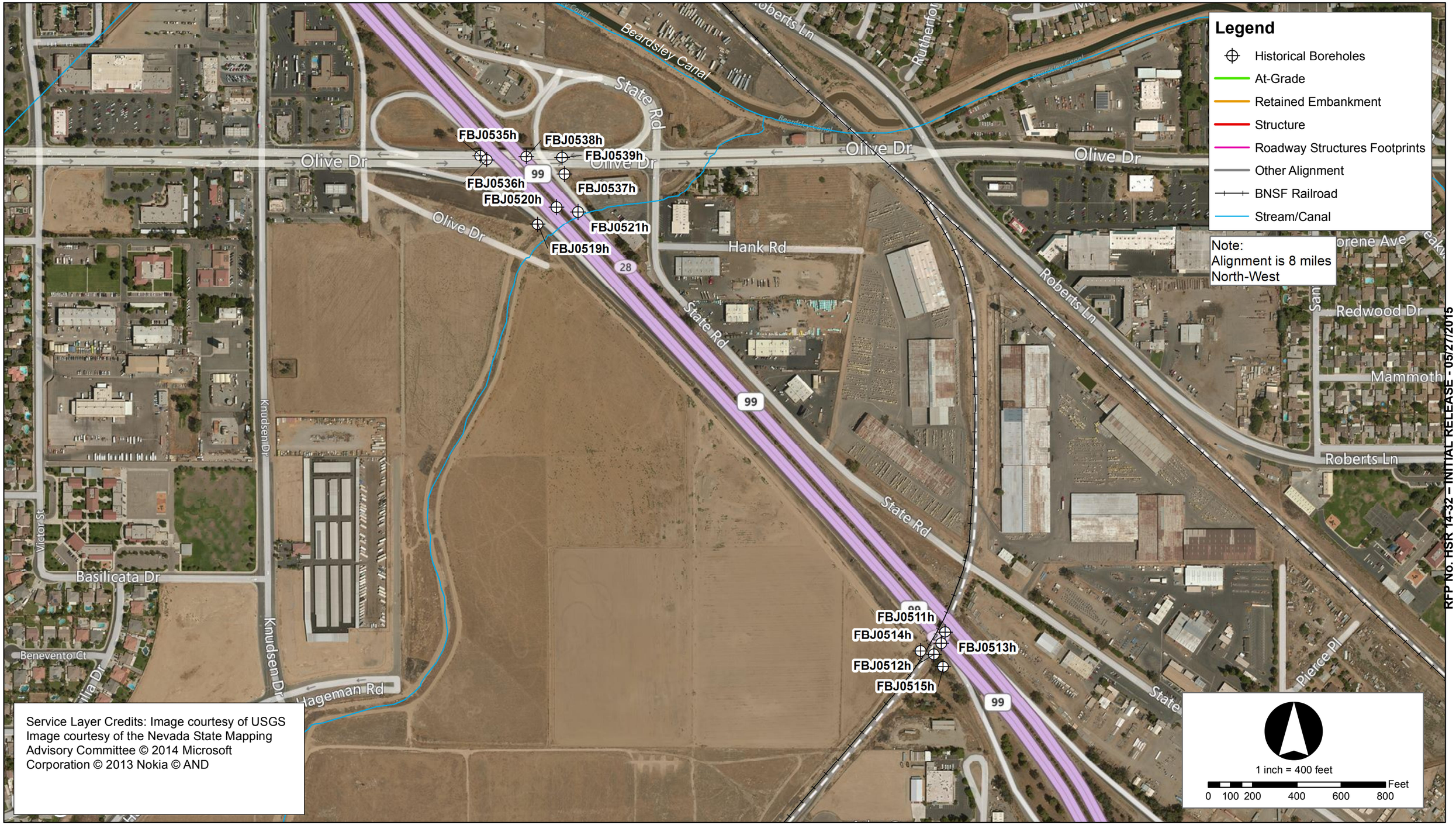
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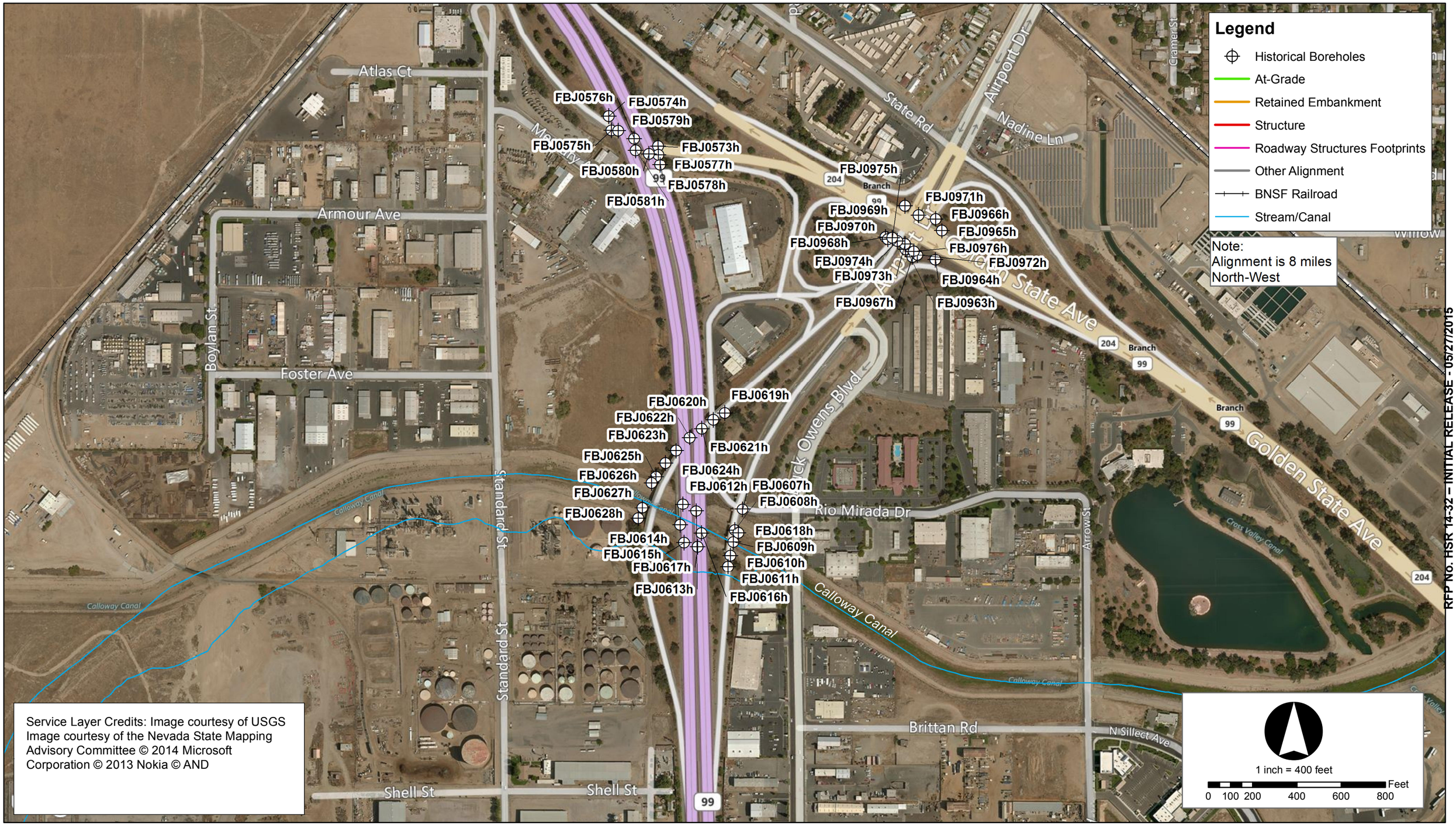


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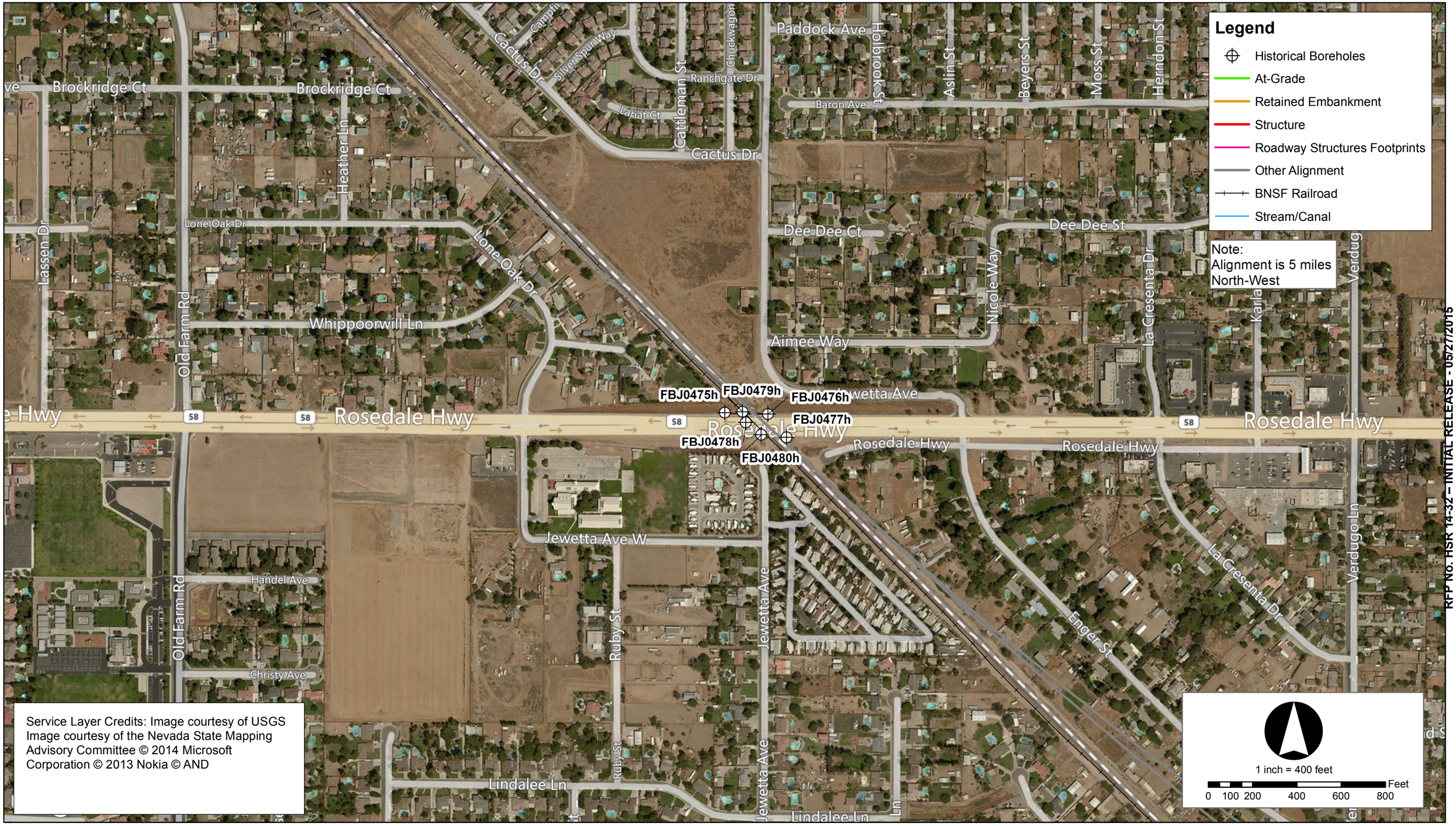
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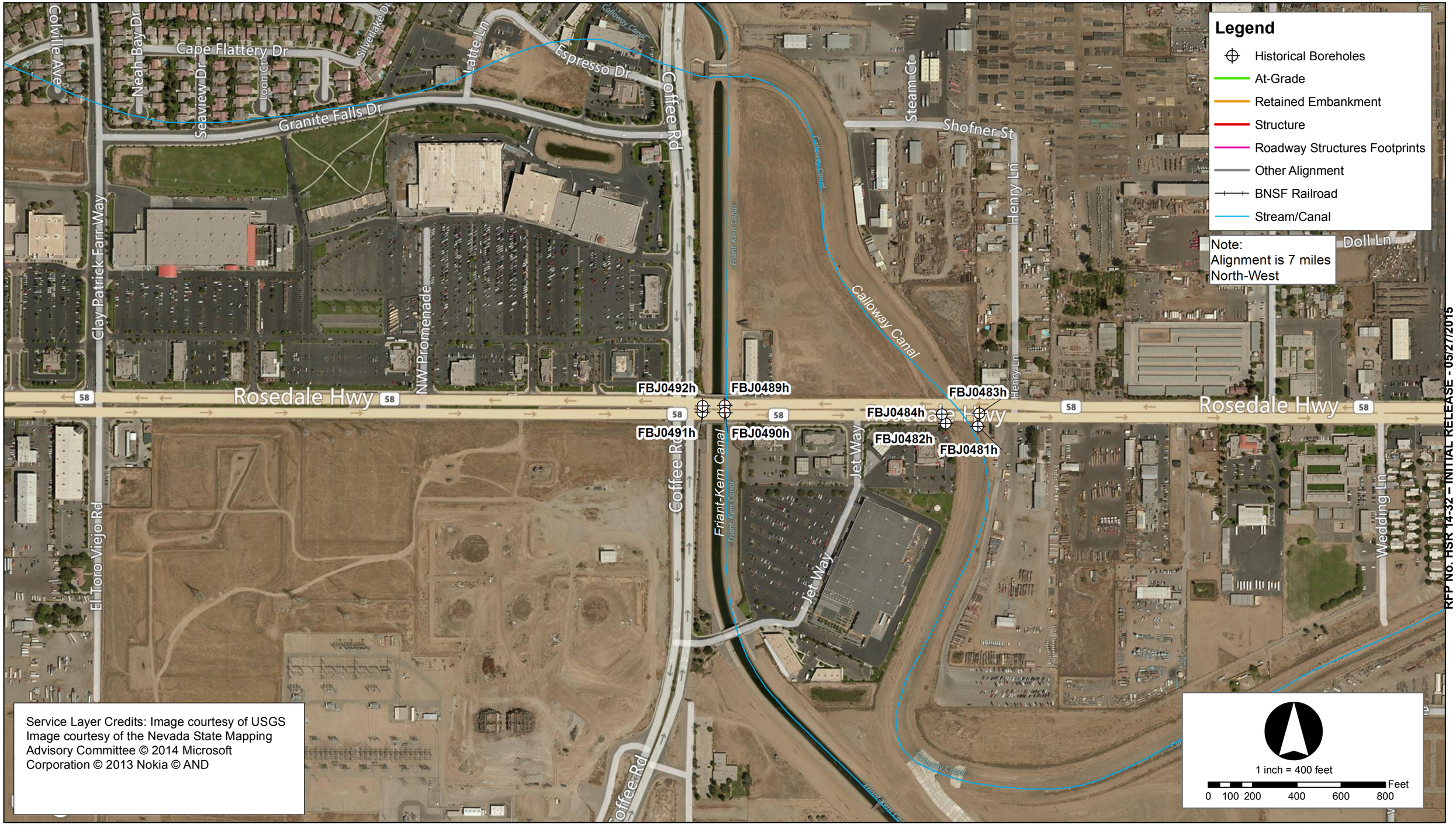


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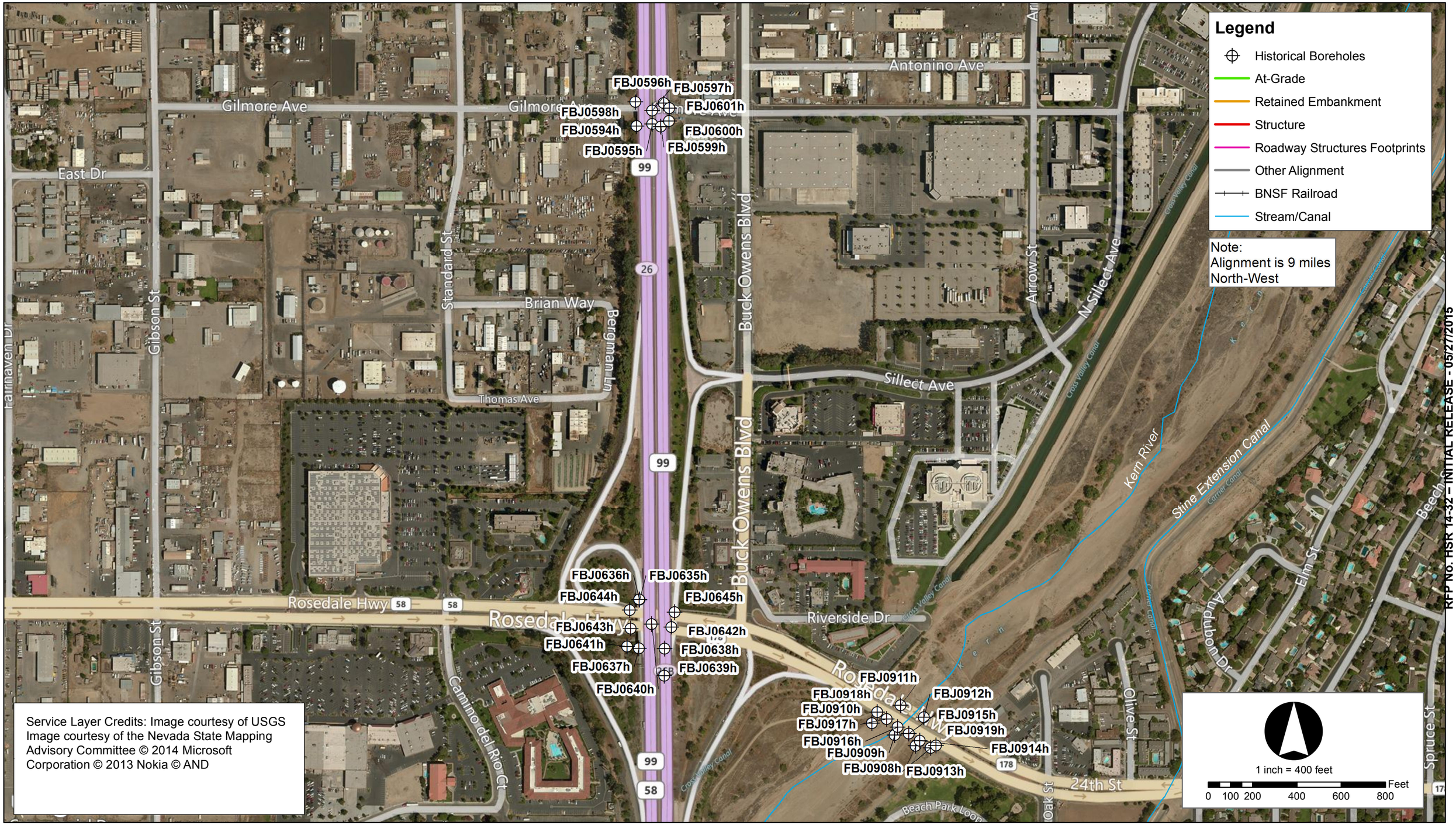


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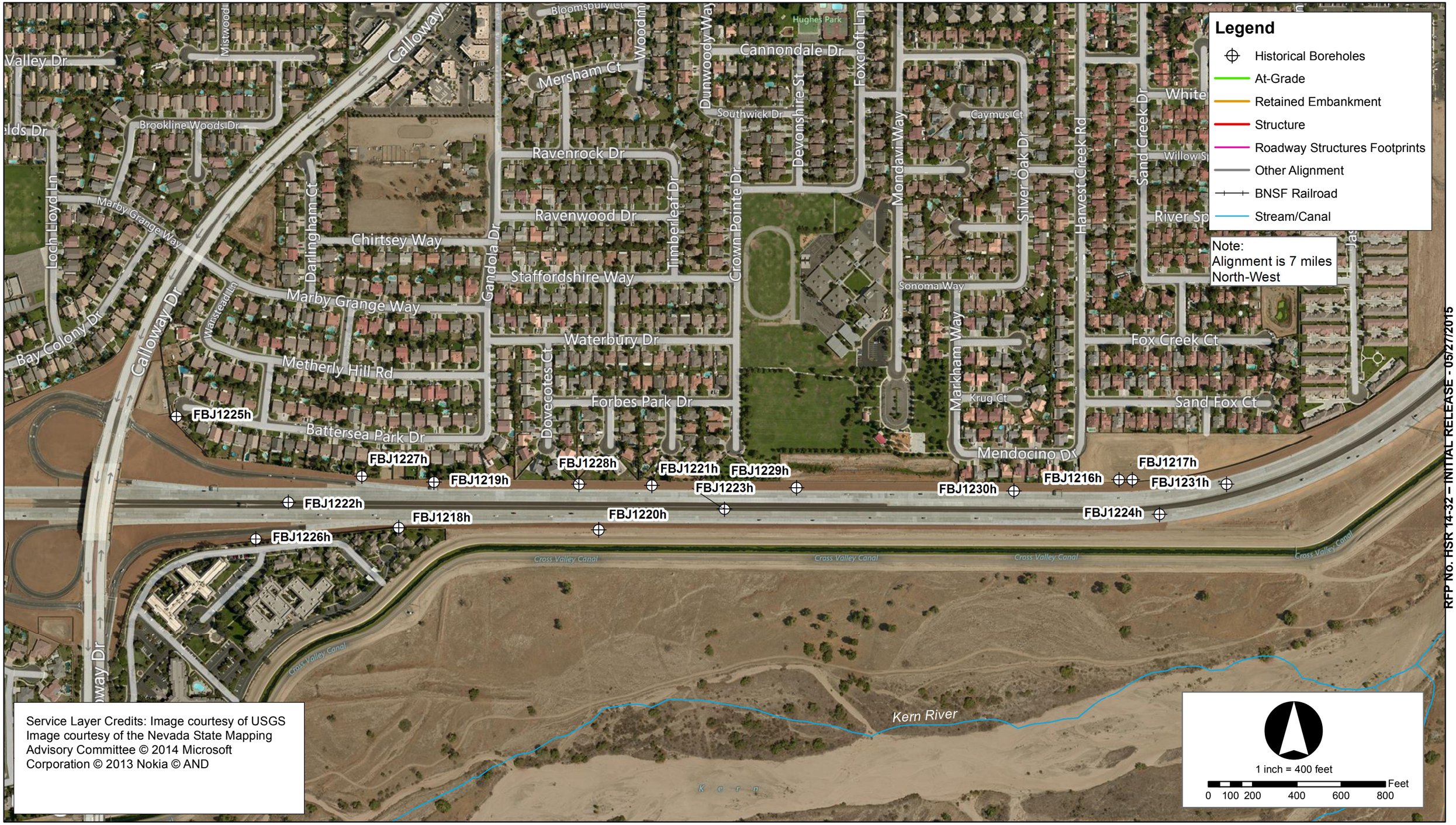
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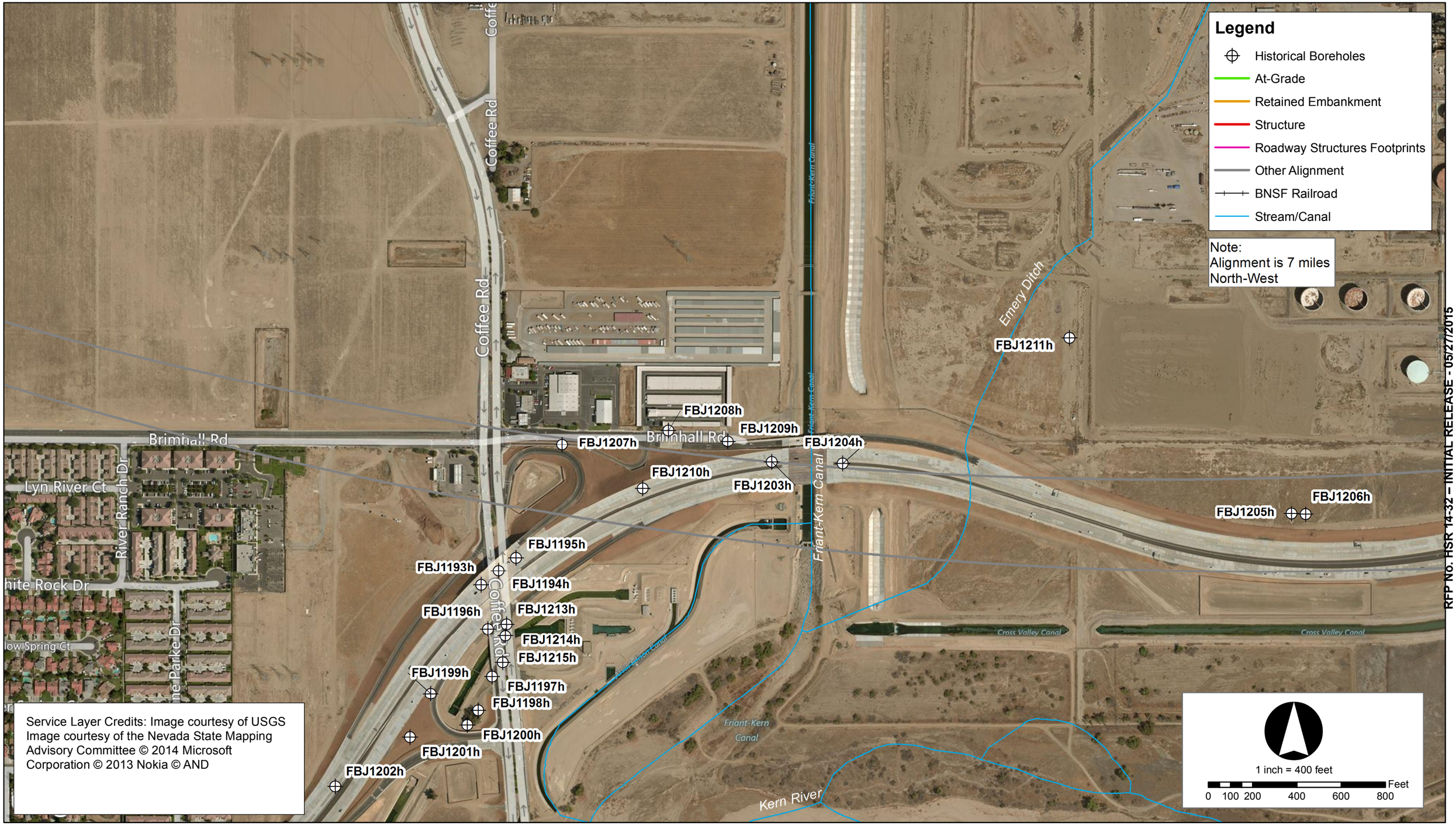


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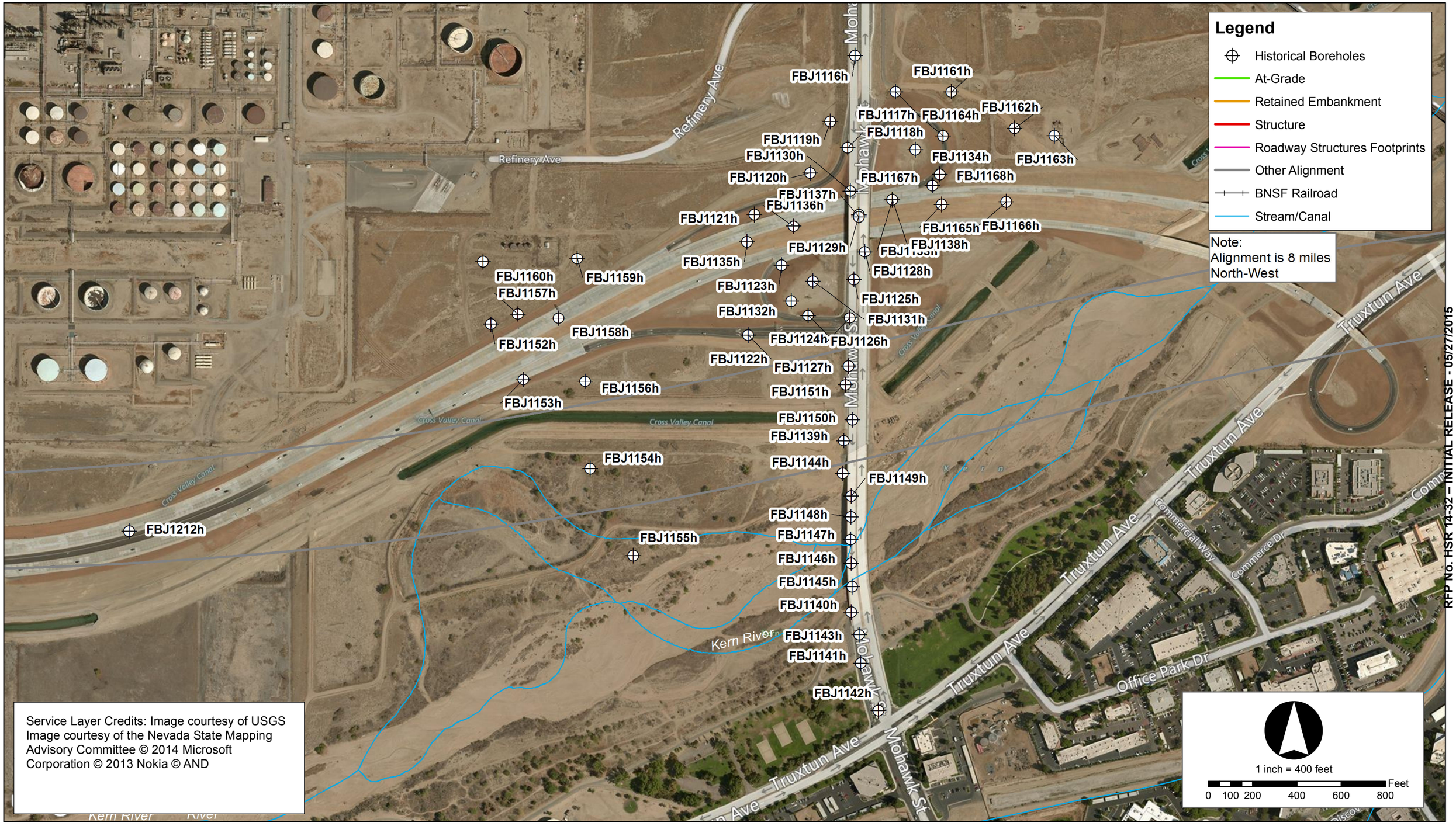


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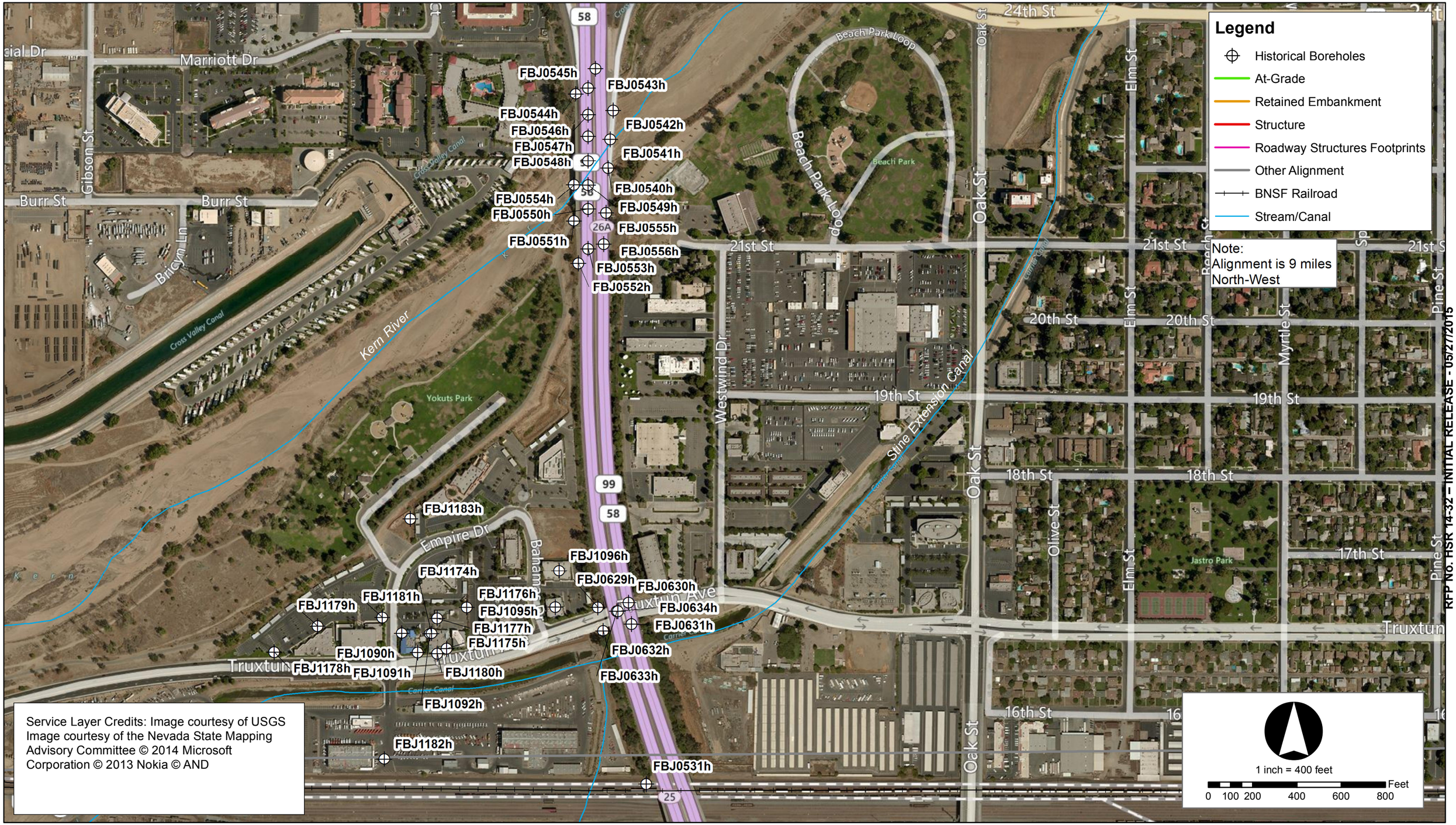


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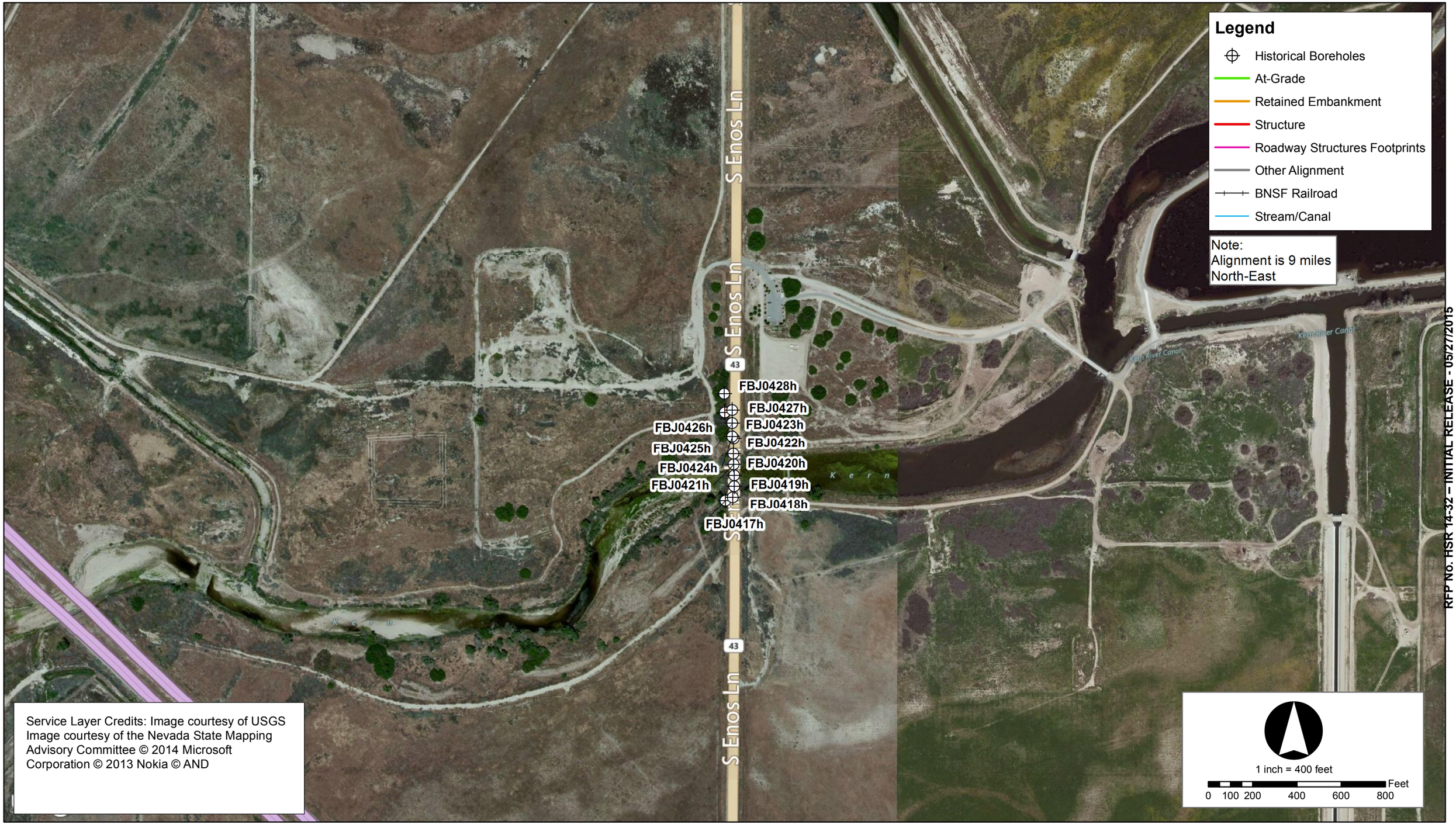
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Appendix B
Exploratory Borehole Records

For gINT Database, see CD

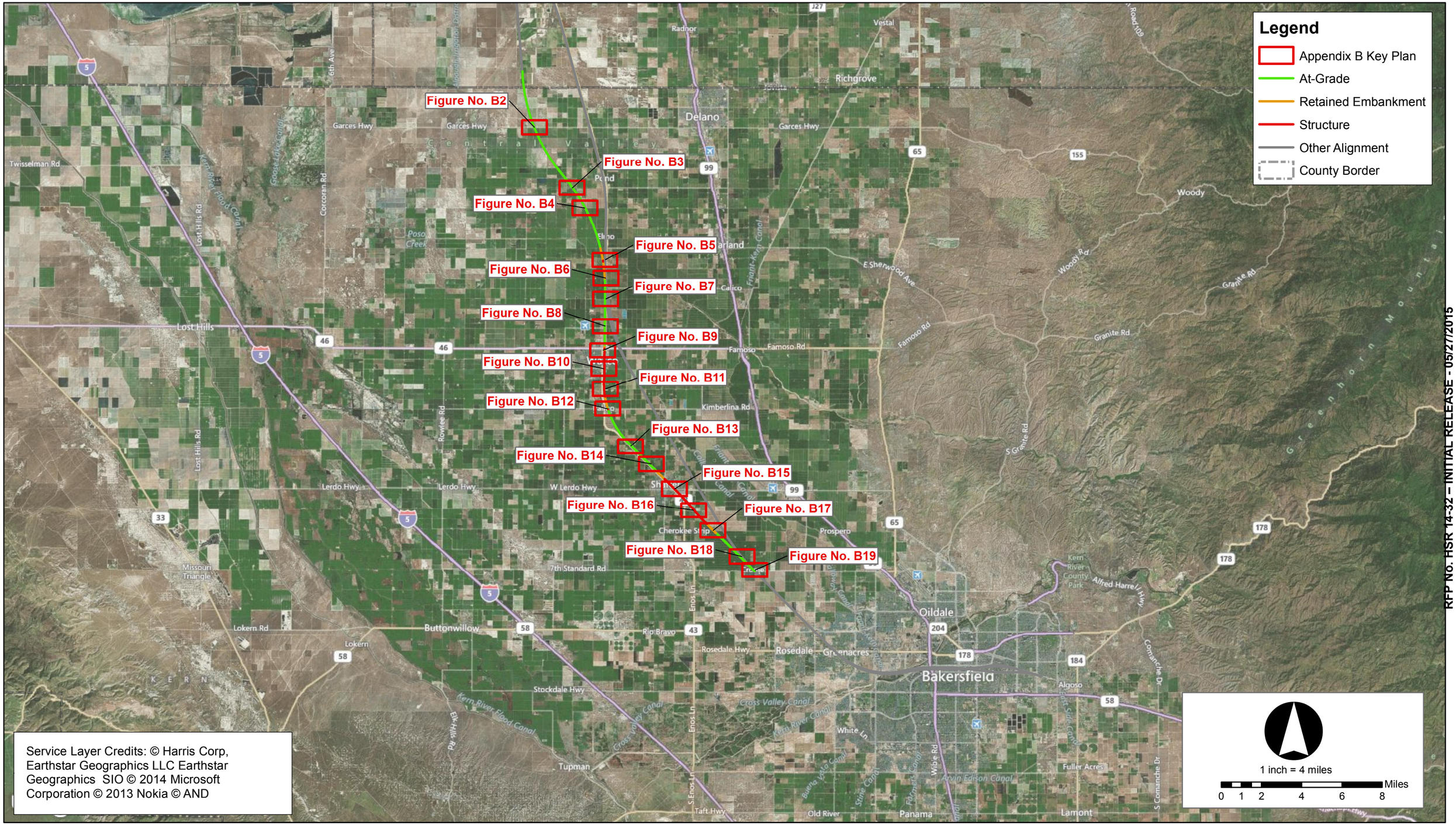
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Table B-1
Summary of Exploratory Borehole Locations, Depths, and In Situ Testing

Borehole ID	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Hand-Auger / Pre-Drill Depths (ft)	Total Depth of Drilling (ft)	In Situ Testing	
						PS[1]	PZ[2]
S0074R	6,444,535	1,796,412	229.6	0 to 5	91.5		
S0075R	6,454,417	1,780,510	257.9	0 to 5	81.5		
S0076R	6,457,862	1,775,227	269.7	0 to 5	101.5		
S0077R	6,165,385	2,431,686	299.0	0 to 5	165.0	✓	✓
S0078R	6,166,302	2,430,151	306.0	0 to 5	151.0		✓
S0079R	6,165,877	2,426,351	304.6	0 to 5	101.5		
S0080R	6,166,087	2,420,976	312.3	0 to 5	81.5		
S0081R	6,165,944	2,413,732	320.7	0 to 5	81.5		
S0082R	6,165,176	2,407,455	328.3	0 to 5	158.0	✓	
S0083R	6,165,442	2,402,676	331.9	0 to 5	151.5		✓
S0084AR	6,166,349	2,392,150	332.8	0 to 5	131.5		
S0084R	6,165,830	2,397,299	337.1	0 to 5	131.5		
S0085R	6,172,217	2,382,170	345.0	0 to 5	101.5		
S0086R	6,175,844	2,378,444	344.7	0 to 5	101.0		
S0087R	6,178,613	2,376,064	346.6	0 to 5	80.9		
S0088AR	6,188,715	2,365,234	346.1	0 to 5	151.0		✓
S0088R	6,183,719	2,370,916	344.6	0 to 5	165.0	✓	
S0089R	6,193,688	2,359,904	341.8	0 to 6	81.5		
S0090R	6,199,886	2,353,842	337.4	0 to 6	136.5		
S0091R	6,203,198	2,350,323	340.4	0 to 5	165.0	✓	

[1] PS = P- and S-wave suspension velocity logging
[2] PZ = Standpipe Piezometer

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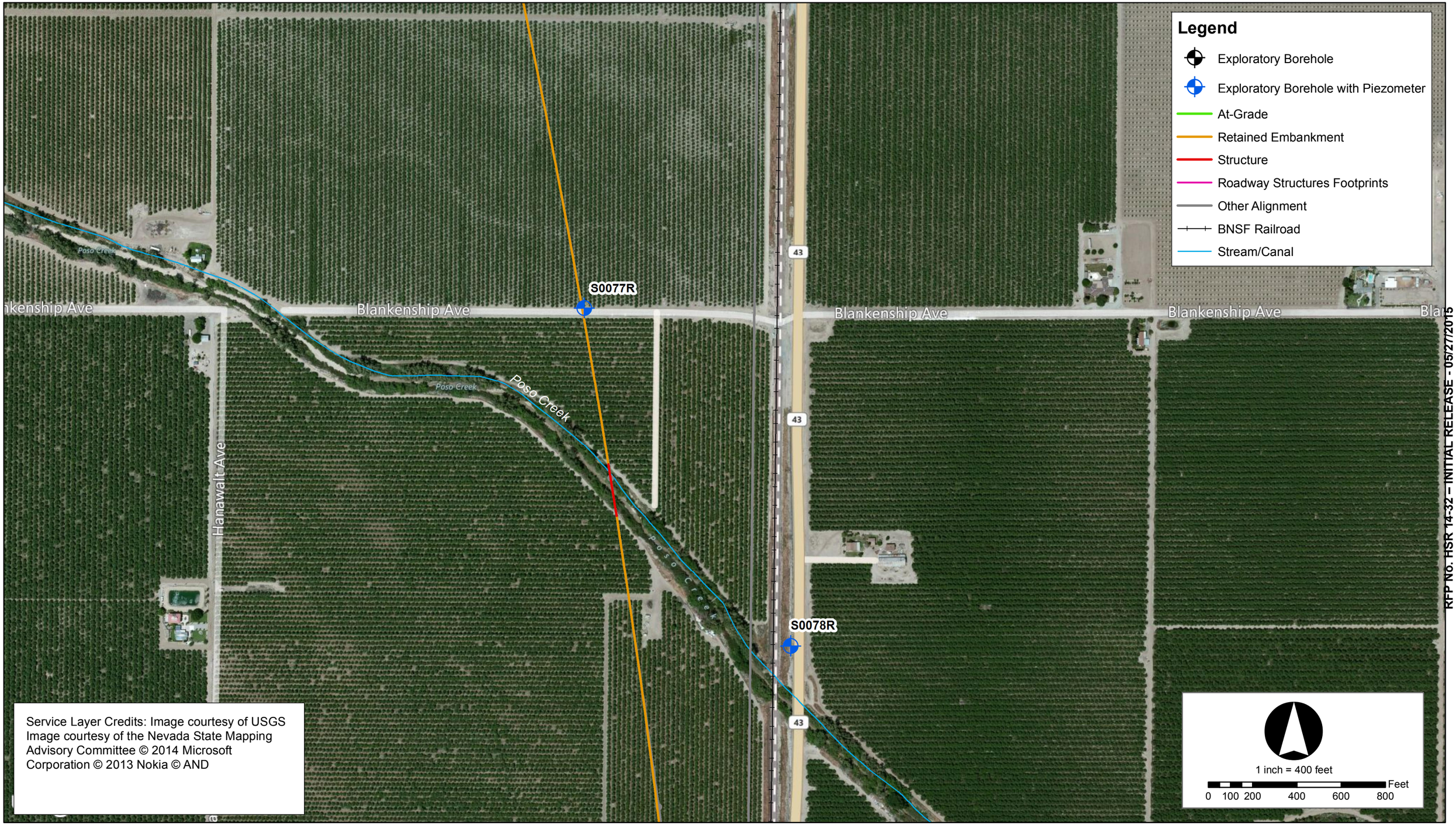


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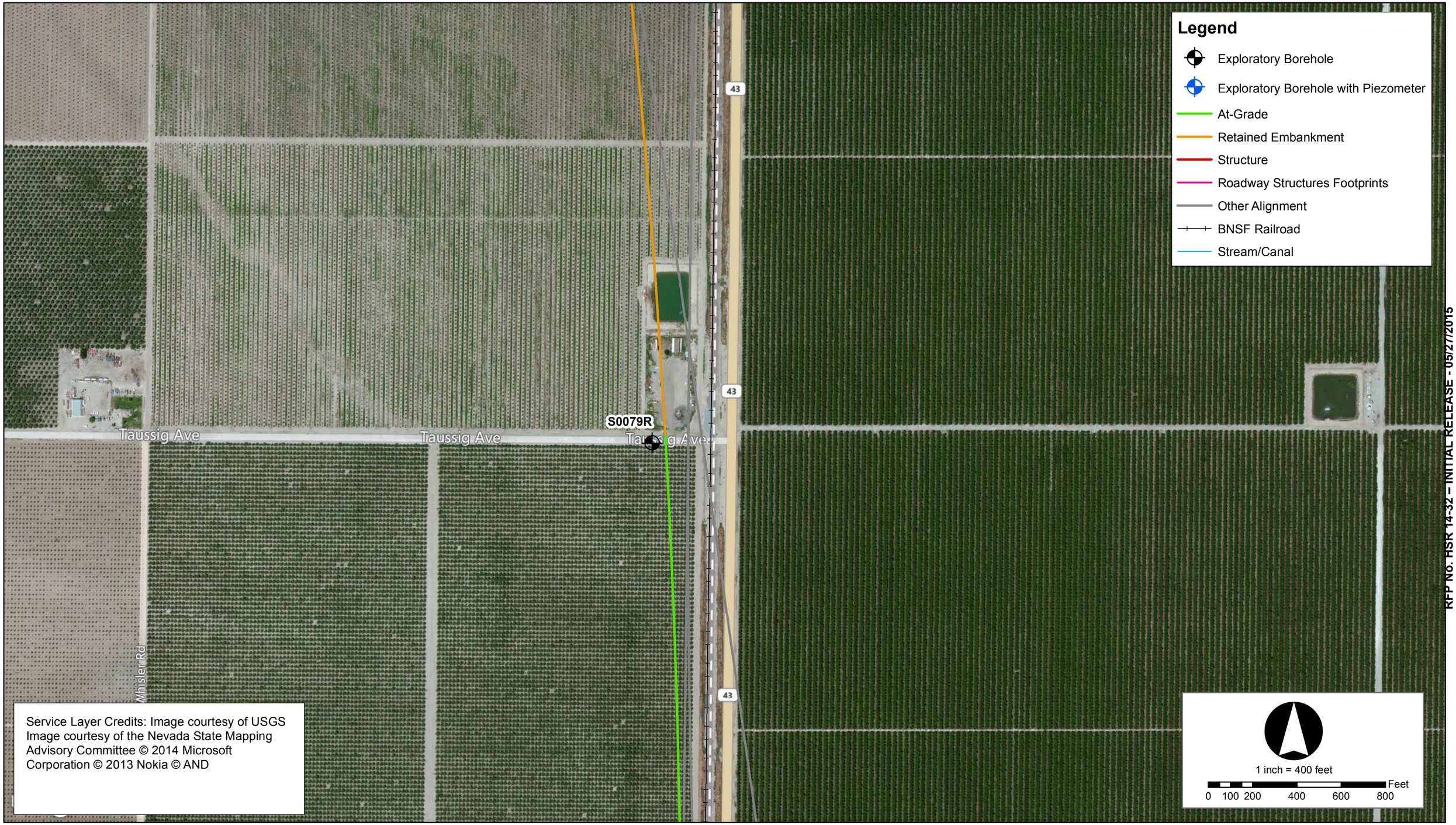


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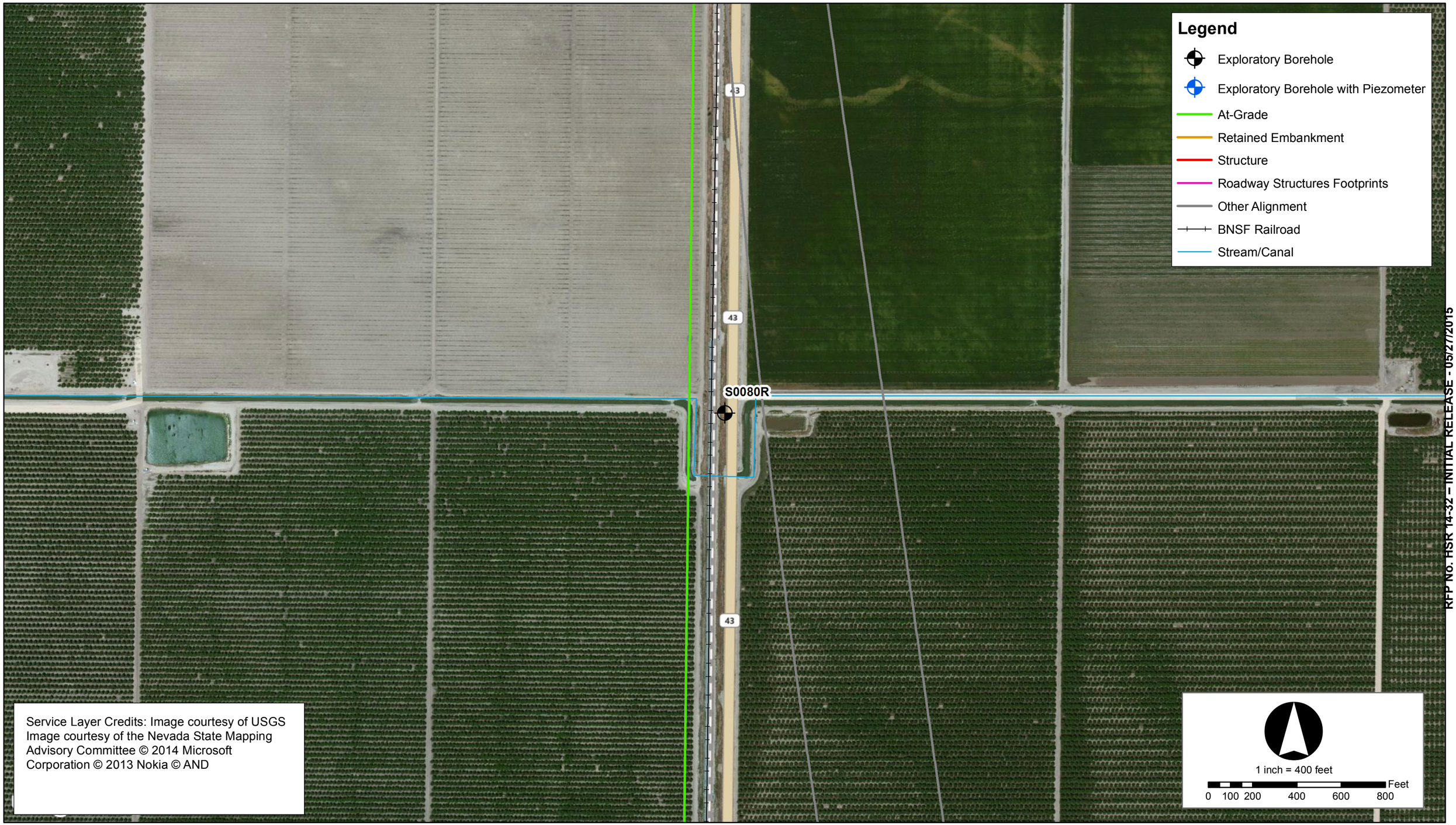
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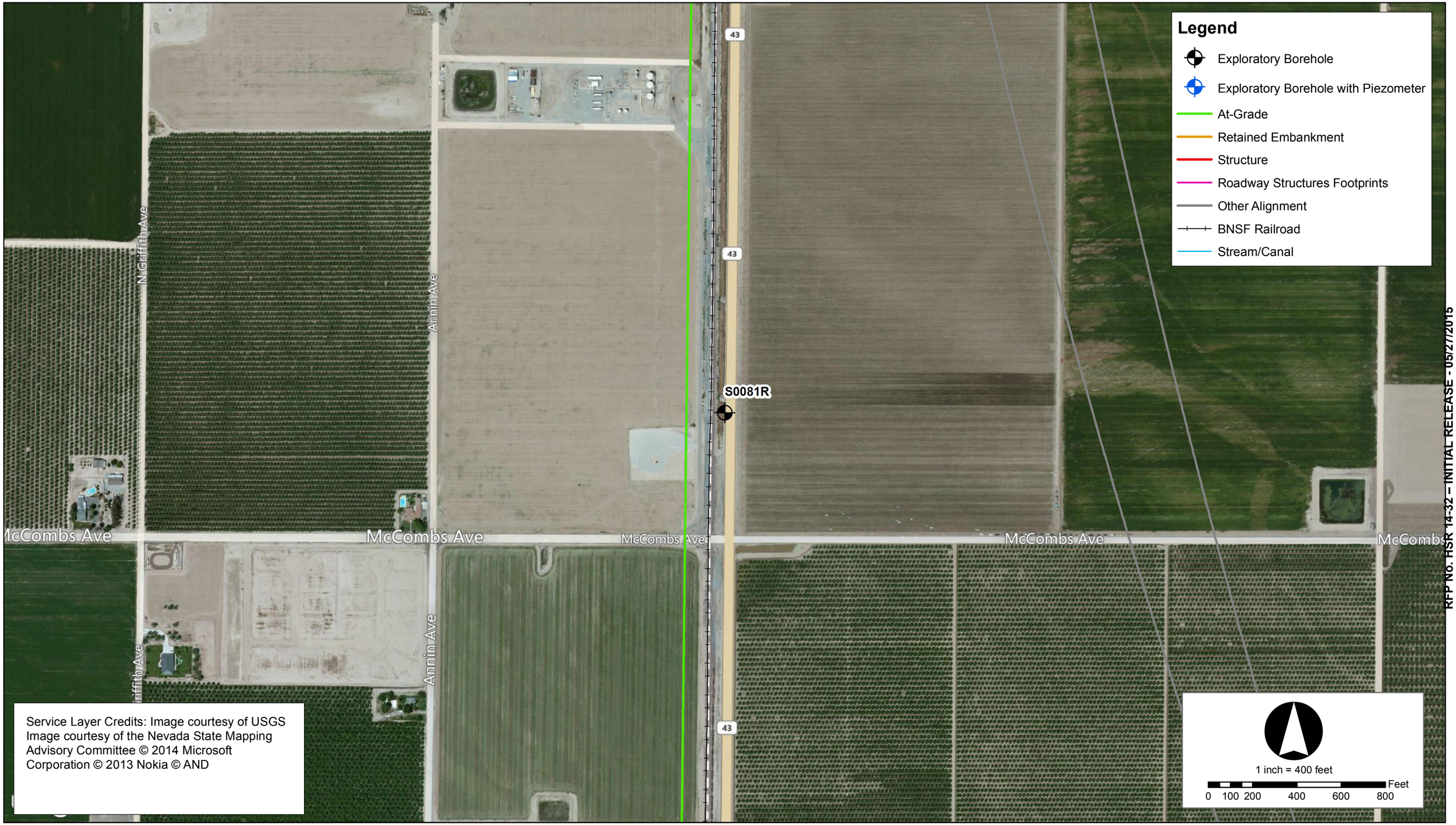


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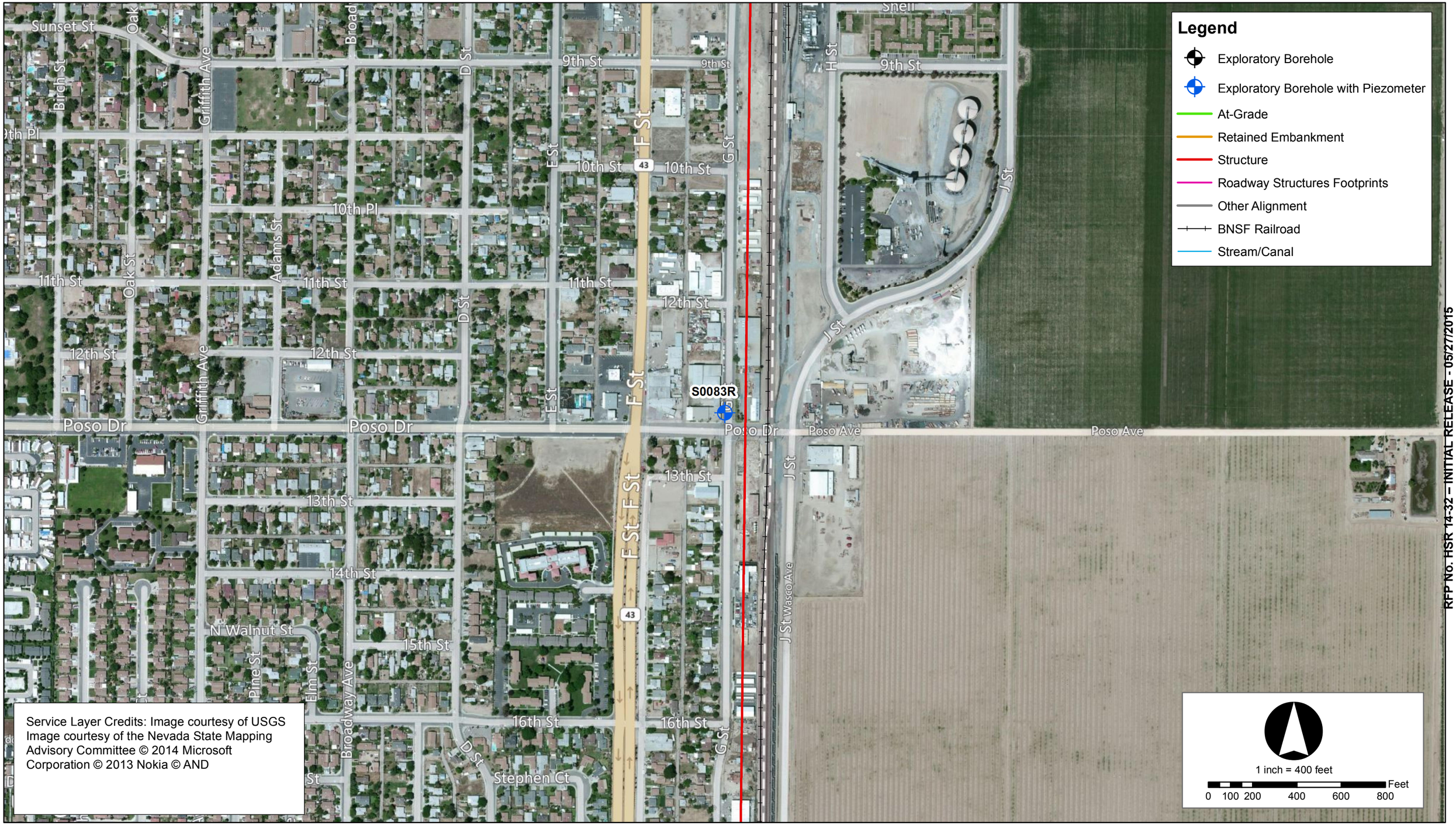
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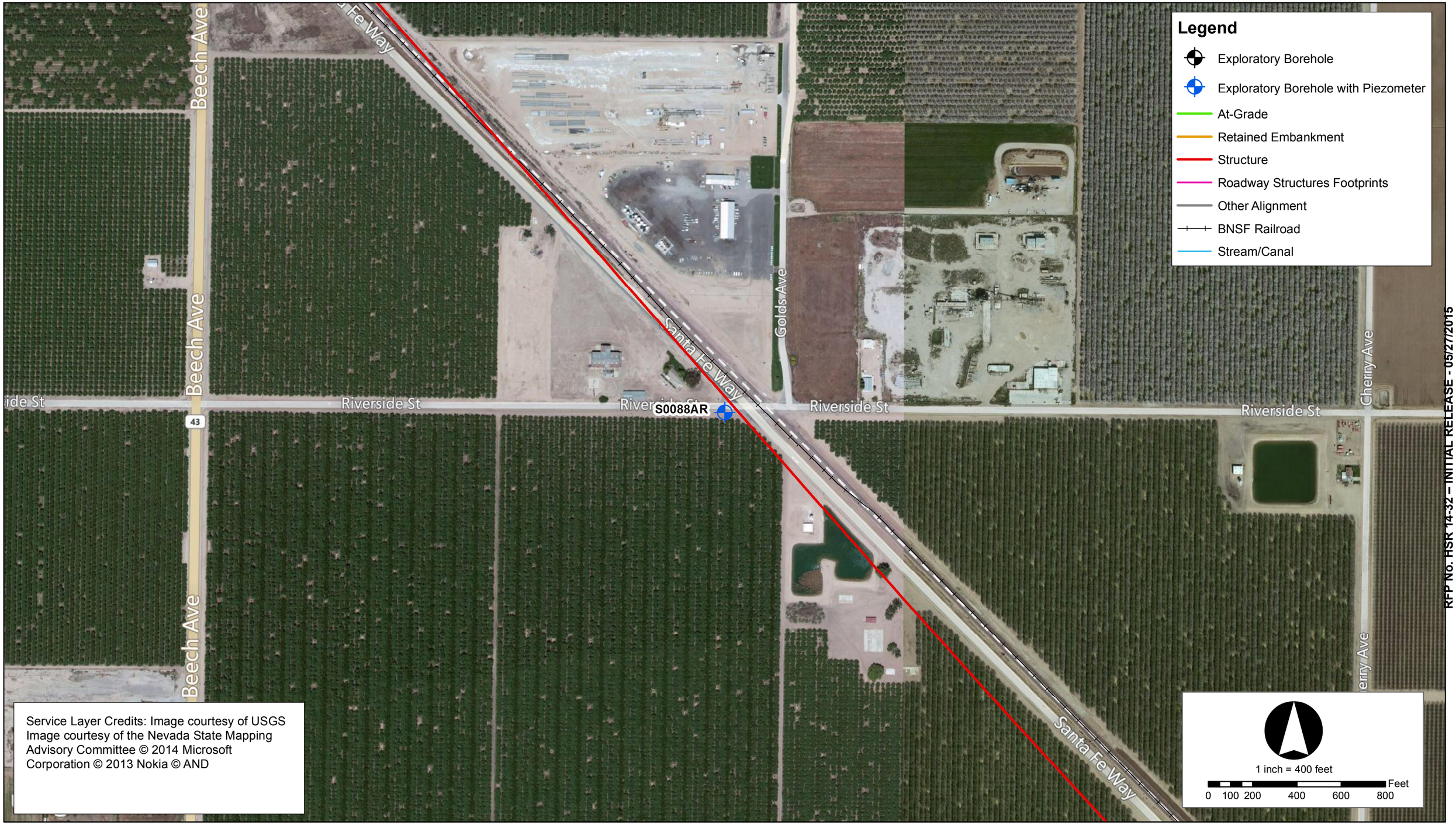
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PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Sep-30-13	Oct-01-13	N1796412.199 / E6444535.159 (NAD83 CA Z5)	S0074R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				229.58 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-91.5')			D-1 (B53)	6.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	91.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); medium dense; brown; dry; little fines; medium SAND; trace GRAVEL; (asphalt 1.5 ft); [FILL].		B-01	0.0			60	60	54.4		8.3						COMP, RV Hand augered to 5.0' below ground surface; trace GRAVEL (asphalt)
			CLAYEY SAND (SC); medium dense; brown; moist; some fines; medium SAND; subangular to subrounded; [NATIVE].																
						5.0													
224.58	5		SANDY SILT (ML/SM); stiff; dark yellowish brown mottled with light yellowish brown; moist; some SAND; fine SAND; weak cementation pockets.		SS-02	5.0	3-5-10	15	18	10									Calcite cementation
						6.5					50.6	93.5	14.0						
			SANDY SILT (ML); medium stiff; brown mottled with yellowish brown and grayish brown; moist; some SAND; low plasticity; low dry strength; low toughness.																
219.58	10				MC-03	10.0	3-4-8	12	18	14									Moderately cemented pockets, cementation detected in the top 1' and not in the bottom 6" DS
			SILTY SAND (SM); loose; dark yellowish brown; moist; some fines; fine SAND.			11.5						106.5	14.0						
214.58	15		- dense; brown.		SS-04	15.0	8-16-18	34	18	10.5									
						16.5													
209.58	20																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0074R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	1 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-30-13	COMPLETION DATE: Oct-01-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1796412.199 / E6444535.159 (NAD83 CA Z5)	HOLE ID: S0074R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 229.58 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-91.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 6.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 91.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		- brown variegated with grayish brown; little fines; medium SAND; subangular to subrounded.		MC-05	20.0 21.5	10-16-19	35	18	16								
			SANDY SILT (ML); stiff; brown variegated with reddish brown; moist; some SAND; fine SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
204.58	25				SS-06	25.0 26.5	6-7-10	17	18	11	77.7							PP: 1.5 tsf
			SANDY lean CLAY (CL); medium stiff; brown; moist; some SAND; fine SAND; medium plasticity; low dry strength; slow dilatancy; low toughness.															
199.58	30				MC-07	30.0 31.5	5-11-15	26	18	16								PP: <1.0 tsf
			SILTY SAND (SM); medium dense; brown; moist; little fines; fine SAND.															
			SANDY SILT (ML); hard; reddish brown to brown; moist; some SAND; fine SAND; low to medium plasticity; low dry strength; slow dilatancy; low toughness.															SANDY CLAY near top grades to SANDY SILT
194.58	35				SS-08	35.0 36.5	3-9-15	24	18	14.5			31.6	43	15			PP: >5.0 tsf
			SANDY lean CLAY (CL); very stiff; brown; moist; little SAND; fine to medium SAND; medium plasticity; high dry strength; no dilatancy; medium toughness.		U-09	37.0 39.5			30	30		94.5	27.6	32	10			Pitcher barrel enlarged the borehole diameter to easily fit pitcher barrel down the hole
189.58	40																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0074R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 5	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER **131577-00**
LOGGED BY NG	BEGIN DATE Sep-30-13	COMPLETION DATE Oct-01-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum) N1796412.199 / E6444535.159 (NAD83 CA Z5)	HOLE ID S0074R
DRILLING CONTRACTOR/DRILLER Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION 229.58 ft (NAVD88)
DRILLING METHOD AUGER(0'-5'), ROTARY(5'-91.5')			DRILL RIG D-1 (B53)	BOREHOLE DIAMETER 6.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID) MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi 78%
BOREHOLE BACKFILL AND COMPLETION Neat cement grout			GROUNDWATER READINGS DURING DRILLING Not Recorded	AFTER DRILLING (DATE) Not Recorded	TOTAL DEPTH OF BORING 91.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	40		- stiff; little SAND; fine SAND; low plasticity; no dilatancy.		MC-10	40.0 41.5	11-10-8	18	18	15	70.7	108.2	12.8	30	10	UU 1818			Indurated SILT in sampler PP: >5.0 tsf TV: 0.81 tsf
			SANDY SILT (ML); stiff; brown mottled with reddish brown; moist; some SAND; medium plasticity; medium dry strength; slow dilatancy; low toughness.																
184.58	45				SS-11	45.0 46.5	4-4-5	9	18	15.5	59								
179.58	50		- very stiff; brown mottled with grayish brown variegated with reddish brown; little SAND; medium SAND; high dry strength; no dilatancy; medium toughness.		MC-12	50.0 51.5	8-11-25	36	18	17		108.5	20.3	29	6	UU 3685			
			CLAYEY SAND (SC); dense; brown; moist; some fines; fine to medium SAND; with frequent calcareous nodules.																
174.58	55				SS-13	55.0 56.5	4-10-25	35	18	16.5	47.5		30.3						
			SANDY SILT (ML); very stiff; dark yellowish brown mottled with brown; moist; some SAND; fine SAND; low																
169.58	60																		

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE BORING RECORD				HOLE ID S0074R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME California High-Speed Train				
BRIDGE NUMBER	PREPARED BY J. Borghesi		DATE 5-14-14	SHEET 3 of 5

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-30-13	COMPLETION DATE: Oct-01-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1796412.199 / E6444535.159 (NAD83 CA Z5)	HOLE ID: S0074R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 229.58 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-91.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 6.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 91.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	60		plasticity; high dry strength; no dilatancy; medium toughness; occasional gray vein (1/8" thick).		MC-14	60.0 61.5	16-24-37	61	18	14									Does not react with HCL PP: >5.0 tsf TV: 1.375, 1.5, 1.5 tsf
164.58	65		- stiff; brown; fine to coarse SAND; low toughness; occasional calcareous nodule (<1/8" diameter).		SS-15	65.0 66.5	3-4-7	11	18	17	57.3								
			SILTY SAND (SM); dense; reddish brown mottled with brown; moist; some fines, fine SAND; trace GRAVEL; subrounded; micaceous.																
159.58	70				MC-16	70.0 71.5	10-19-36	55	18	15		96.9	26.1						Munsell color 5YR/4/4, occasional dark gray sand
			SANDY lean CLAY (CL); very stiff; reddish brown mottled with brown and dark gray; moist; some fine SAND; medium plasticity; medium dry strength; slow dilatancy; low toughness.																Strong cementation
154.58	75				SS-17	75.0 76.5	9-10-14	24	18	8.5			26.8	42	19				
			CLAYEY SAND (SC); very dense; brown; moist; some fines; grades to little fines; medium SAND.																
149.58	80																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0074R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 5

CALIFORNIA High-Speed Rail Authority

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Sep-30-13	Oct-01-13	N1796412.199 / E6444535.159 (NAD83 CA Z5)	S0074R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				229.58 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-91.5')			D-1 (B53)	6.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	91.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-18	80.0 81.0	29-50/5.5"	50/5.5"	11.5	10								
			SANDY SILT (ML); hard; brown variegated with white; some SAND; fine SAND; medium plasticity; low toughness; micaceous; frequent white veins.															
144.58	85				SS-19	85.0 86.5	9-16-25	41	18	12								White veins do not react to HCL
			CLAYEY SAND (SC); dense; brown variegated with white; some fines; fine SAND; micaceous.															
139.58	90				MC-20	90.0 91.5	15-18-25	43	18	14								
			Borehole terminated at a depth of 91.5' on 10/1/2013.															
			Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.															
134.58	95		See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
129.58	100																	

REPORT TITLE				HOLE ID
BORING RECORD				S0074R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 5

CALIFORNIA High-Speed Rail Authority

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Oct-08-13	Oct-08-13	N1780509.609 / E6454416.925 (NAD83 CA Z5)	S0075R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				257.88 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-81.5')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SANDY SILT (ML/SM); medium stiff; light brown; dry; some SAND; fine SAND; moderate cementation; [NATIVE].		B-01	0.0			60	60	53.5		11.5						CBR, COMP Hand augered down to 5.0' below grade surface
			SANDY SILT (ML); medium stiff; light brown; dry; some SAND; fine SAND; no plasticity; low dry strength; rapid dilatancy; low toughness.			5.0													Moderate cementation 1'bgs - 2.5'bgs
252.88	5		- stiff; yellowish brown; little SAND.		MC-02	5.0	6-8-12	20	18	15.5									
						6.5					64.1	92.9	18.2						TXCD
247.88	10		- very stiff; dark yellowish brown variegated with gray; moist; some SAND.		SS-03	10.0	5-10-17	27	18	12.5									
			SILTY SAND (SM); medium dense; yellowish brown; dry; some fines; fine SAND; micaceous.			11.5													
242.88	15		- dense; dark yellowish brown variegated with gray.		MC-04	15.0	22-24-20	44	18	12		122.5	10.9						DS
			SANDY SILT (ML); hard; dark yellowish brown variegated with gray; some SAND; fine SAND; trace coarse SAND; micaceous.			16.5													PP: 5.0 tsf TV: 0.6 tsf
237.88	20		Poorly graded SAND with SILT (SP-SM); dense; grayish brown; moist; little fines; fine SAND; trace																

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0075R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	1 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-08-13	COMPLETION DATE: Oct-08-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1780509.609 / E6454416.925 (NAD83 CA Z5)	HOLE ID: S0075R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 257.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		coarse SAND; subrounded.		SS-05	20.0 21.5	12-17-22	39	18	11.5	10.7		2.2					
			SILTY SAND (SM); medium dense; moist; little to some fines; fine SAND; micaceous.															
232.88	25		SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND; no plasticity; medium dry strength; rapid dilatancy; low toughness.		MC-06	25.0 26.5	12-19-22	38	18	17		100.5	23.6					PP: >5.0 tsf TV: 0.325, <0.1, <0.1 tsf DS
227.88	30		- very stiff; brown variegated with brownish gray; some SAND; fine SAND.		SS-07	30.0 31.5	4-4-7	11	18	9.5	68.8		23.8					PP: 2.5, 3.0, 3.5 tsf
					U-08	32.0 34.5			30	9.5								Driller reported no change
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND.															
222.88	35		- dense; reddish brown; medium SAND; micaceous.		MC-09	35.0 36.5	18-26-39	65	18	16.5	21.8	120.5	8.9					
			SANDY SILT (ML); very stiff; brown variegated with white and mottled with dark gray; moist; some SAND; fine SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
217.88	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0075R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 5	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-08-13	COMPLETION DATE: Oct-08-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1780509.609 / E6454416.925 (NAD83 CA Z5)	HOLE ID: S0075R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 257.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				SS-10	40.0 41.5	6-10-12	22	18	7	65.4		19.3					
212.88	45		SILTY SAND (SM); very dense; brown; moist; little fines; fine to medium SAND.		MC-11	45.0 46.5	22-33-44	77	18	16	21.8	126.2	10.0					
207.88	50		Poorly graded SAND with SILT (SP-SM); dense; grayish brown mottled with reddish brown; moist; few fines; medium SAND; trace coarse SAND; subangular to subrounded.		SS-12	50.0 51.5	15-18-27	45	18	11	11							
202.88	55		SANDY SILT (ML); hard; brown; moist; little SAND; fine to medium SAND; no plasticity; medium dry strength; rapid dilatancy; low toughness; micaceous.		MC-13	55.0 56.3	16-28-50/4"	78/10"	16	15								PP: 4.25, 4.0, 5.0 tsf TV: 0.3, 0.25, 0.35 tsf
197.88	60																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0075R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 3 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-08-13	COMPLETION DATE: Oct-08-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1780509.609 / E6454416.925 (NAD83 CA Z5)	HOLE ID: S0075R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 257.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		SANDY SILT (ML/SM); very stiff; brown laminated with white; moist; some SAND; fine SAND; no plasticity; medium dry strength; rapid dilatancy; low toughness; blocky from 61.3' - 61.4'; strong cementation.		SS-14	60.0 61.5	12-20-29	49	18	12.5	52.4		20.5					HCL fizzes vigorously with white veins; possible CALCITE veins PP: 3.0 tsf
			SILTY SAND (SM); very dense; brown; moist; little fines; fine SAND; ocassional white layer (1/2' thick) at 65.5'; micaceous.															
192.88	65				MC-15	65.0 66.5	22-28-36	64	18	15	31							White vein does not react to HCL; reddish brown tint to soil color
			SANDY SILT (ML); very stiff; dark reddish brown; moist; some SAND; fine SAND; low plasticity; low dry strength; rapid dilatancy; low toughness; micaceous.															
187.88	70				SS-16	70.0 71.5	5-5-6	11	18	12.5	69.3		24.7					Munsell color 5YR/3/4 PP: 2.5 tsf
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; medium SAND; subrounded; micaceous.															
182.88	75				MC-17	75.0 76.4	32-47-50/4.5"	97/10.5"	16.5	10								
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND; micaceous; frequent white infilling; moderate cementation.															
177.88	80																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0075R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 5

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-08-13	COMPLETION DATE: Oct-08-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1780509.609 / E6454416.925 (NAD83 CA Z5)	HOLE ID: S0075R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 257.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				SS-18	80.0 81.5	14-20-30	50	18	12								
172.88	85																	
167.88	90																	
162.88	95																	
157.88	100																	

Borehole terminated at a depth of 81.5' on 10/8/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0075R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 5 of 5

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-26-13	COMPLETION DATE: Sep-27-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1775226.908 / E6457862.338 (NAD83 CA Z5)	HOLE ID: S0076R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 269.74 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; dry; little fines; medium SAND; fine to medium SAND; subangular to subrounded; micaceous; [NATIVE].		B-01	0.0			60	60								COMP, RV Hand augered 5.0' below ground surface
264.74	5		- medium dense.			5.0												
					MC-02	5.0 6.5	5-7-12	19	18	15		126.9	9.0					DS No recovery in shoe
			Poorly graded SAND with SILT (SP-SM); medium dense; brown; dry; few fines; medium SAND; subrounded to rounded; micaceous.															
259.74	10				SS-03	10.0 11.5	5-7-8	15	18	10.5	9							Munsell Color 10YR/5/3
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
254.74	15				MC-04	15.0 16.5	11-10-13	23	18	17	25							
249.74	20																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-26-13	COMPLETION DATE: Sep-27-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1775226.908 / E6457862.338 (NAD83 CA Z5)	HOLE ID: S0076R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 269.74 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				SS-05	20.0 21.5	5-8-6	14	18	8								Coarse SAND sloughing in hole
			SANDY SILT (ML); very stiff; dark yellowish brown; moist; some SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
244.74	25				MC-06	25.0 26.5	7-10-10	20	18	15		106.9	22.3					DS PP: >5.0, >5.0, >5.0 tsf TV: 0.85, 0.80 tsf
			SILTY SAND (SM); very dense; brown; moist; little to few fines; fine SAND; micaceous.															
239.74	30				SS-07	30.0 31.5	15-23-34	57	18	12	21							
234.74	35		- dark yellowish brown; medium SAND; subrounded.		MC-08	35.0 36.5	29-50-50/5.5"	50/11.5"	17.5	17.5		120.7	8.2					DS
229.74	40																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 6	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Sep-26-13	Sep-27-13	N1775226.908 / E6457862.338 (NAD83 CA Z5)	S0076R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				269.74 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101.5')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		- medium dense; brown grades to reddish brown; little to some fines, fine SAND; occasional SILT seam (1/4" thick).		SS-09	40.0 41.5	7-8-13	21	18	12.5								
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; high toughness.															
224.74	45				MC-10	45.0 46.5	12-17-23	40	18	14		105.9	20.7	34	20	UU 2847		PP: >5.0 tsf TV: 2.3 tsf
			CLAYEY SAND (SC); dense; dark yellowish brown; moist; some fines; fine to medium SAND; subrounded.															
219.74	50				SS-11	50.0 51.5	15-21-27	48	18	12.5	26							Coarse SAND at 50.0'-50.8'; did not retain much coarse SAND
			SILTY SAND (SM); very dense; dark yellowish brown; moist; little fines; fine to medium SAND; trace coarse SAND; subangular to subrounded; micaceous.															
214.74	55				MC-12	55.0 55.9	31-50/5"	50/5"	11	10								
209.74	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 6

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-26-13	COMPLETION DATE: Sep-27-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1775226.908 / E6457862.338 (NAD83 CA Z5)	HOLE ID: S0076R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 269.74 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		- some fines; fine SAND.		SS-13	60.0 61.5	22-25-33	58	18	7.5								
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; fine SAND; micaceous.															
204.74	65				MC-14	65.0 65.9	44-50	50/5"	11	8								
199.74	70		- medium dense; dark yellowish brown.		SS-15	70.0 71.5	12-8-16	24	18	7.5								
			SANDY lean CLAY (CL); stiff; brown; moist; some SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															PP: 1.5 tsf
			Poorly graded SAND with SILT (SP-SM); very dense; brown; moist; few fines; medium SAND; subrounded to rounded; few coarse SAND.															
194.74	75				MC-16	75.0 76.4	35-48-50/5"	98/11"	18	13	11	121.7	8.5					
			Poorly graded SAND (SP); dense; dark yellowish brown; wet; trace fines; medium SAND; micaceous.															
189.74	80																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 4 of 6	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-26-13	COMPLETION DATE: Sep-27-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1775226.908 / E6457862.338 (NAD83 CA Z5)	HOLE ID: S0076R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 269.74 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				SS-17	80.0 81.5	12-19-30	49	18	14.5								
			SANDY SILT (ML); hard; dark yellowish brown; wet; some SAND; fine SAND; interbedded with SILTY SAND (SM) ; <1 mm thick.															
			SILTY SAND (SM); dense; dark yellowish brown; wet; some fines; fine SAND; micaceous.															
184.74	85				MC-18	85.0 86.5	11-25-35	60	18	17	42							
179.74	90				SS-19	90.0 91.5	11-17-16	33	18	11.5								Munsell color 10YR/4/4
174.74	95		- moist.		MC-20	95.0 96.5	15-27-31	58	18	15.5	44							
			SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															PP: 5.0 tsf
			SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND.															
169.74	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 5 of 6

CALIFORNIA High-Speed Rail Authority

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-26-13	COMPLETION DATE: Sep-27-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N1775226.908 / E6457862.338 (NAD83 CA Z5)	HOLE ID: S0076R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 269.74 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
100					SS-21	100.0 101.5	12-19-21	40	18	7								

Borehole terminated at a depth of 101.5' on 9/27/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

164.74 105

159.74 110

154.74 115

149.74 120

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0076R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 6 of 6	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-01-13	COMPLETION DATE: Oct-07-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2431686.011 / E6165384.533 (NAD83 CA Z5)	HOLE ID: S0077R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 299.01 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SANDY SILT (ML); medium stiff; dark brown; dry; some SAND; medium SAND; rounded to subrounded.		B-01	0.0			60	60	60								COMP, RV Hand augered to 5' below ground surface
294.01	5		SANDY lean CLAY (CL); very stiff; brown variegated with grayish brown partings; moist; little SAND; fine SAND; medium plasticity; high dry strength; slow dilatancy; medium toughness.		MC-02	5.0	3-7-11		18	13	72			30	14				Cementation reacts vigorously with HCL PP: 5.0 tsf TV: .36 tsf
			SANDY SILT (ML); very stiff; dark brown variegated with grayish brown partings; moist; little SAND; fine SAND; medium plasticity; high dry strength; slow dilatancy; medium toughness; moderate cementation.			6.5					63	109.4	14.8			UU 2943			
289.01	10				SS-03	10.0	5-9-12		18	7.5	62								Cementation reacts vigorously with HCL PP: 5.0 tsf
						11.5													
			Poorly graded SAND (SP); medium dense; grayish brown; moist; trace fines; fine SAND; micaceous.																
284.01	15				MC-04	15.0	8-11-20		18	12.5		102.0	3.9						Salt and pepper color dry DS
						16.5													
			SANDY lean CLAY (CL/SC); very stiff; dark yellowish brown variegated with gray; some SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; high toughness; moderate cementation.																
279.01	20																		

(continued)

CALIFORNIA High-Speed Rail Authority

URS | HMM | ARUP — California High-Speed Train

REPORT TITLE: BORING RECORD				HOLE ID: S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 9

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG / Oct-01-13 / Oct-07-13	N2431686.011 / E6165384.533 (NAD83 CA Z5)		S0077R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		299.01 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	165 ft

Elev (ft)	Depth (ft)	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20			SS-05	20.0 21.5	5-9-8	17	18	8.5	55							HCL reacts vigorously with sample
274.01	25	SANDY lean CLAY (CL); stiff; light yellowish brown mottled with brown; moist; little SAND; fine SAND; high plasticity; medium dry strength; no dilatancy; low toughness; frequent gray partings (veins).		MC-06	25.0 26.5	4-7-12	19	18	16		91.4 85.4	28.2 33.4	48	31	UU 1929		PP: 2.6 tsf TV: .59 tsf
269.01	30	SILTY SAND (SM); dense; reddish brown; moist; some fines; medium SAND; moderate cementation; occasional gray partings <1mm.		SS-07	30.0 31.5	8-17-25	42	18	10.5								HCL reacts vigorously with sample
264.01	35	SILTY SAND (SM); dense; grayish brown; moist; little fines; fine SAND; subangular to subrounded; micaceous.		MC-08	35.0 36.5	12-16-32	48	18	16	29							Blow counts; resistance increase in the last 3"
		CLAYEY SAND (SC); dense; yellowish brown; moist; some fines; fine SAND; subrounded; weak cementation.															
259.01	40	SANDY SILT (ML); very stiff; brown; moist; some SAND; fine SAND; low dry strength; slow dilatancy; low toughness.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	2 of 9	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Oct-01-13	Oct-07-13	N2431686.011 / E6165384.533 (NAD83 CA Z5)	S0077R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin			PS Logging	299.01 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')			D-1 (B53)	5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer			Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				SS-09	40.0 41.5	5-6-17	23	18	12	66							PP: >5.0 tsf
			SANDY lean CLAY (CL); very stiff; brown mottled with dark gray; moist; some SAND; fine SAND; low plasticity; low dry strength; slow dilatancy; micaceous; occasional dark brown parting.															
254.01	45				MC-10	45.0 46.5	7-12-21	33	18	17	64	108.5	21.6	35	18			PP: 1.6 tsf TV: .30 tsf TXCD Possible organic parting at 45.3'
			SANDY SILT (ML); very stiff; brown; moist; some SAND; fine SAND; low plasticity; medium dry strength; low toughness.															
249.01	50				SS-11	50.0 51.5	4-6-12	18	18	13.5	65							PP: 1.5 tsf
			SILTY SAND (SM); medium dense; brown mottled with reddish brown; moist; some fines; fine SAND; micaceous.															
244.01	55				MC-12	55.0 56.5	11-13-23	36	18	16	35	119.0	13.2					DS
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; fine to coarse SAND; subangular to subrounded.															
239.01	60																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 9

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-01-13	COMPLETION DATE: Oct-07-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2431686.011 / E6165384.533 (NAD83 CA Z5)	HOLE ID: S0077R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 299.01 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				SS-13	60.0 61.5	21-31-43	74	18	14	13		6.1					
			SANDY lean CLAY (CL); very stiff; brown mottled with dark gray; moist; little fine SAND.															
234.01	65				MC-14	65.0 66.4	12-41-50/4.5"	91/10.5"	16.5	16								PP: 2.0 tsf TV: .30 tsf Retained all three samples; smashed the brass tube at the bottom of sample #1
			CLAYEY SAND (SC); very dense; brown; moist; some fines, fine SAND.															
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; fine SAND; subangular to subrounded; micaceous.															
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; little fines; fine SAND; subrounded; micaceous.															
229.01	70				SS-15	70.0 71.5	11-29-34	63	18	13.5	18							
224.01	75		- few fines.		MC-16	75.0 76.0	31-50-0	50/5.5"	11.5	11.5		116.8	8.4					Recovery not recorded in notes DS
			SANDY lean CLAY (CL); very stiff; brown mottled with brownish gray; moist; little SAND; fine SAND; medium plasticity; medium dry strength; slow dilatancy; low toughness; pockets of cementation 1/8" diameter.															
219.01	80																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 9

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-01-13	COMPLETION DATE: Oct-07-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2431686.011 / E6165384.533 (NAD83 CA Z5)	HOLE ID: S0077R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 299.01 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				SS-17	80.0 81.5	8-10-11	21	18	14				40	22			Cementations reacted vigorously to 10% HCL
			- brown; some SAND; subangular; medium plasticity; low dry strength; rapid dilatancy; stratified with dense SILTY SAND layers 3"- 6" thick.		U-18	82.0 84.5			30	22.5	59	108.7	19.7	37	21			TXCD Pitcher barrel sampler pushed 2.5/3.0'
214.01	85		SANDY SILT (ML); hard; dark yellowish brown variegated and mottled with brownish gray; some SAND; fine SAND; no plasticity; low dry strength; rapid dilatancy; low toughness.		MC-19	85.0 86.5	16-29-40	69	18	14		105.5	22.1					PP: >5.0 tsf TV: .88 tsf
			- brown; high dry strength; slow dilatancy; medium toughness; grades to SILTY SAND (SM); dense; reddish brown; moist; little fines; medium SAND; subangular.		U-20	87.0 89.5			30	21								
209.01	90		SANDY lean CLAY (CL); hard; reddish brown mottled with grayish brown; moist; some SAND; fine SAND; medium plasticity; low dry strength; slow dilatancy; low toughness.		SS-21	90.0 91.5	12-11-21	32	18	8								PP: >5.0 tsf PP: 2.6 tsf TV: .75 tsf
204.01	95		SANDY SILT (ML); hard; brown; moist; some SAND; medium plasticity; high dry strength; high toughness.		MC-22	95.0 96.5	11-18-26	44	18	18								
			CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND; pockets of SANDY CLAY (1" x 1/2").															
199.01	100		SANDY SILT (ML/SM); dense; brown; wet; some fines; fine SAND; micaceous; stratified with hard SANDY SILT layers 3"- 6" thick.															

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 5 of 9

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Oct-01-13	Oct-07-13	N2431686.011 / E6165384.533 (NAD83 CA Z5)	S0077R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin			PS Logging	299.01 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')			D-1 (B53)	5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer			Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				SS-23	100.0 101.5	10-18-18	36	18	9.5	53		21.3					
			SANDY SILT (ML); very stiff; dark yellowish brown; wet; little SAND; fine SAND; high plasticity; high dry strength; no dilatancy; low toughness; micaceous; grades to SILTY SAND (SM); very dense; yellowish brown; wet; some fines; fine SAND; micaceous.															
194.01	105				MC-24	105.0 106.5	13-21-32	53	18	16		117.2	16.6					PP: 2.7 tsf TV: .80 tsf TXCD
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; wet; some SAND; fine SAND; medium plasticity; high dry strength; slow dilatancy; medium toughness.															
189.01	110				SS-25	110.0 111.5	9-12-15	27	18	11.5	59			32	15			
184.01	115		- hard; brown mottled with reddish brown variegated with dark gray; fine to medium SAND; high plasticity; no dilatancy; high toughness.		MC-26	115.0 116.5	17-36-47	83	18	14		115.5	16.1 23.4	36	22	UU 7797		PP: >5.0 tsf TV: 2.29 tsf
			SILTY SAND (SM); very dense; grayish brown and brown; wet; little fines; medium SAND; micaceous.															
179.01	120																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	6 of 9

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-01-13	COMPLETION DATE: Oct-07-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2431686.011 / E6165384.533 (NAD83 CA Z5)	HOLE ID: S0077R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 299.01 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				SS-27	120.0 121.5	27-43-50/5.5"	93/11.5"	17.5	8.5								
174.01	125		SANDY lean CLAY (CL); very stiff; dark yellowish brown mottled with reddish brown variegated with gray; some fines; medium SAND; medium plasticity; high dry strength; no dilatancy; medium toughness; moderate cementation in gray seams and partings (<1mm-5mm thick).		MC-28	125.0 126.5	15-18-21	39	18	18		102.0 115.9	23.3 16.4	35	21	UU 2883		Gray veins vigorously react to HCL PP: 3.0 tsf TV: .4 tsf
169.01	130		- dark yellowish brown; wet; some SAND.		SS-29	130.0 131.5	10-11-14	25	18	11.5			16.3	30	15			
164.01	135		- hard; low plasticity; low toughness.		MC-30	135.0 136.5	13-24-34	58	18	13								
159.01	140		SILTY SAND (SM); very dense; brown; wet; little fines; medium SAND.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 7 of 9	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG / Oct-01-13 / Oct-07-13	N2431686.011 / E6165384.533 (NAD83 CA Z5)		S0077R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		299.01 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	140				SS-31	140.0 141.5	17-28-25	53	18	10.5								Bottom 3" are SILT; possible CALCITE cementation in the bottom 3"; fizzes vigorously with HCL At 141' SANDY SILT 141.3+
			SANDY SILT (ML); hard; brown variegated with light brown and gray; wet; some SAND; fine SAND; no plasticity; high dry strength; rapid dilatancy; medium toughness; moderate cementation.															
			SILTY SAND (SM); very dense; brown; wet; some fines; fine SAND; weak cementation.															
154.01	145				MC-32	145.0 146.4	18-34-50/5"	84/11"	17	16								Driven very hard in the bottom 1" driven At 145.5' SILTY SAND to 146.0'; SANDY SILT below
			SANDY SILT (ML); hard; grayish brown; wet; some SAND; fine SAND; low plasticity; medium dry strength; high toughness; moderate cementation.															
			SILTY SAND (SM); very dense; brown; wet; little fines; medium SAND; stratified with hard, variably cemented SANDY SILT.															Trace coarse SAND
149.01	150				SS-33	150.0 151.5	16-22-31	53	18	11.5								Last sample taken at 150.0' to 151.5'bgs At 150.5' SILTY SAND
144.01	155																	
139.01	160																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	8 of 9	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-01-13	COMPLETION DATE: Oct-07-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2431686.011 / E6165384.533 (NAD83 CA Z5)	HOLE ID: S0077R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 299.01 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), PS(2-7/8"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
160																		
134.01	165		Borehole terminated at a depth of 165.0' on 10/07/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
129.01	170																	
124.01	175																	
119.01	180																	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0077R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 9 of 9	

Log|PIEZOMETER LOG 2/15/2012 11:00:17 AM

STANDPIPE PIEZOMETER INSTALLATION LOG

(continued)

PIEZOMETER NO.:

BORING NO.: **S0077R**

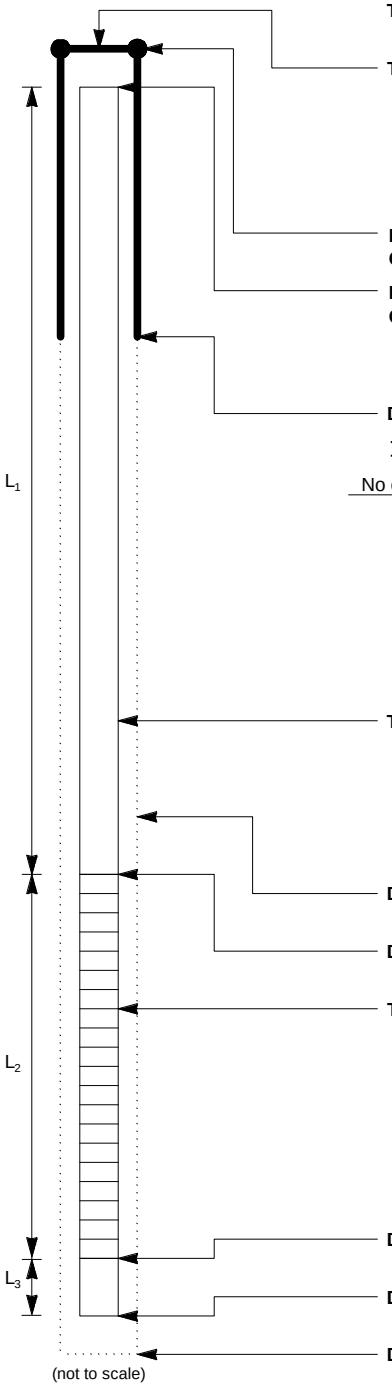
Project:	California High Speed Rail - Fresno to Bakersfield	**Project No.:**	131577-00
Location:	Blankenship Avenue	**Project Mgr:**	M. Walker
Client:	California High Speed Rail Authority	**Field Eng. Staff:**	NG
Drilling Co.:	Gregg Drilling	**Date Installed:**	10/7/2013
Driller:	D. McMackin		

Ground El.: 299.01 ft.
Vertical Datum: NAVD 88

Boring Location:
N: 2431686.011 **E:** 6165384.533
Horizontal Datum: NAD 83 CA Z5

Well Cover:
☐ Guard Pipe ☒ Roadway Box
☐ Other:

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See corresponding borehole log for stratigraphy	Neat Cement Grout
	5-ft Bentonite Plug
	#3 Filter Sand



Total Number of Piezometers in Borehole: 1

Type of Protective Cover/Lock: Traffic-rated 2-hex bolt cover with padlock
- Length: 1.0 ft.
- Inside Diameter: 8.0 in.

Height/Depth of Cover Above/Below Ground Surface: 0.08 ft.

Height/Depth of Riser Pipe Above/Below Ground Surface: 0.33 ft.

Depth of Bottom of Casing: 0 ft.

Type of Seal	Top of Seal (ft)	Thickness (ft)
No casing installed		

Type of Riser Pipe: 2" PVC Sch 40 Riser
- Inside Diameter of Riser Pipe: 2.0 in.
- Type of Backfill Around Riser: Neat cement grout backfill above a 5.0 ft bentonite plug

Diameter of Borehole: 5.0 in.

Depth of Top of Well Screen: 45.0 ft.

Type of Screen: 2" PVC Sch 40 Screen
- Screen Gauge or Size of Openings: 0.02 in.
- Diameter of Screen: 2.0 in.
- Type of Backfill Around Screen: #3 sand

Depth of Bottom of Well Screen: 65.0 ft.

Depth of Bottom of Silt Trap: 70.0 ft.

Depth of Bottom of Borehole: 165.0 ft.

165.0 ft. (Bottom of Exploration) — 165.0 ft.

*Note: Numbers refer to depth from ground surface in feet
(+) = depth below ground surface
(-) = depth above ground surface

45.0 ft. Length of Riser (L_1)	+	20.0 ft. Length of Screen (L_2)	+	5.0 ft. Length of Silt Trap (L_3)	=	70.0 ft. Total Length

Comments: Sand type: CEMEX #3 sand, clean, graded, kiln dried, Monterey (50 lb bags)
Bentonite: EnviroPlug, medium, Wyo-Ben, Inc. (50 lb bags)
Cement: Basalite Type II-V cement, Portland cement (47 lb bags)
Bailed the water out of the hole using a loft bailer (1:30 pm)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		CLAYEY SAND with GRAVEL (SC); loose; brown; dry; some fines; few GRAVEL; fine SAND; subangular to subrounded; [FILL].		B-01	0.0			60	60									COMP, CORR, RV Hand augered to 5.0' below ground surface Boring completed where SR43 is on an embankment for a creek crossing
300.99	5		Poorly graded GRAVEL with SAND and COBBLES (GP); loose to very dense; brown and black; dry; some SAND; few COBBLES.			5.0													
			SANDY SILT (ML); medium stiff; brown mottled with dark brown; moist; some SAND; no plasticity; low dry strength; slow dilatancy.		SS-02	5.0 6.5	5-4-3	7	18	10	45								
			SILTY SAND (SM/ML); loose; brown; moist; some fines; fine SAND.																
			Poorly graded SAND (SP); loose; grayish brown; trace fines; medium SAND; fine to coarse SAND; subangular to subrounded; micaceous.																
295.99	10				MC-03	10.0 11.5	6-5-5	10	18	11.5		104.4	6.1						DS
290.99	15		- medium dense; dry; coarse grades to fine SAND; subrounded.		SS-04	15.0 16.5	6-8-9	17	18	10.5									
			SANDY lean CLAY (CL); very stiff; olive brown; moist; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; low toughness; [NATIVE].																
285.99	20																		

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 8

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	7-8-13	21	18	15.5									PP: 3.4 tsf TV: .70 tsf
			SILTY SAND (SM); medium dense; grayish brown; moist; little fines; fine SAND.																Occasional dark gray mottleing in the top 3" of retained sample
280.99	25				SS-06	25.0 26.5	11-11-13	24	18	10.5	29								
			SANDY lean CLAY (CL); very stiff; brown; moist; some SAND; fine SAND; high plasticity; high dry strength; no dilatancy; medium toughness; with CLAYEY SAND (SC); loose; brown variegated with dark gray; moist; some fines; fine SAND.																
275.99	30				MC-07	30.0 31.5	7-7-7	14	18	16.5		98.0	23.1	37	21				PP: 3.7 tsf TV: .70 tsf
270.99	35		- hard; dark yellowish brown; medium plasticity.		SS-08	35.0 36.5	6-9-11	20	18	11									Munsell color 4/4 PP: >5.0 tsf
			SANDY SILT (ML); very stiff; dark yellowish brown; some SAND; fine SAND; low plasticity; low toughness; stratified with variably SILTY SAND and SANDY lean CLAY.																
265.99	40																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 8	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0 41.5	8-10-10	20	18	15									PP: 3.1 tsf TV: .67 tsf
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some grades to little fines; fine SAND; medium plasticity; high dry strength; no dilatancy; low toughness.																Possible organics in SAND
260.99	45				SS-10	45.0 46.5	5-6-7	13	18	11.5									PP: 2.75 tsf
			SILTY SAND (SM); dense; brown; moist; some grades to little fines; fine SAND; micaceous.																
255.99	50				MC-11	50.0 51.5	7-16-34	50	18	16		106.9	20.9						DS
			SANDY SILT (ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; no plasticity; medium dry strength; slow dilatancy; low toughness; micaceous.																
250.99	55				SS-12	55.0 56.5	5-7-8	15	18	12	71								PP: 2.5 tsf
245.99	60																		

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 3 of 8

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		- hard; low dry strength; rapid dilatancy.		MC-13	60.0	9-20-35	55	18	16	79							
			SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.			61.5					34	119.7	12.8					DS PP: 2.8 tsf TV: .40 tsf
240.99	65				SS-14	65.0	11-15-16	31	18	11								PP: 3.0 tsf
			SANDY SILT (ML); hard; dark yellowish brown; moist; some SAND; fine SAND; no plasticity; low dry strength; low toughness; micaceous.			66.5					62							
235.99	70					70.0	9-8-10	18	18	0								
						71.5												
			- very stiff; some to little SAND; low plasticity; medium dry strength.		MC-15	72.0	8-10-16	26	18	12								Waited 5 minutes for the soil to hydrate PP: 2.6 tsf TV: 1.25 tsf TXCD
						73.5					81	99.1	24.9					
230.99	75		SANDY SILT (ML/SM); very stiff; dark yellowish brown; moist; low plasticity; medium dry strength; low toughness.		SS-16	75.0	10-14-15	29	18	8								
						76.5					52							
			SANDY SILT (SM); hard; dark yellowish brown variegated with dark brown; moist; some SAND; fine SAND; no plasticity; slow dilatancy; stratified with SILTY SAND (SM) of varying gradation; dense; dark yellowish brown; moist; some fines; fine SAND.															
225.99	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0 81.5	12-26-42	68	18	14								PP: 2.5 tsf TV: .60 tsf
220.99	85		- dark yellowish brown; not stratified.		SS-18	85.0 86.5	7-11-19	30	18	15.5	66							PP: 2.5 tsf
			SANDY lean CLAY (CL); hard; brown; moist; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; low toughness.															
215.99	90				MC-19	90.0 91.4	23-43-50/4.5"	93/10.5"	16.5	13.5								PP: 1.4 tsf TV: .30 tsf
			SILTY SAND (SM); very dense; dark yellowish brown; moist; little fines; medium SAND; fine to coarse SAND; subrounded; micaceous.															Fine GRAVEL to coarse SAND observed in the slough
			SANDY lean CLAY (CL); hard; brown; wet; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; high toughness.															
210.99	95				SS-20	95.0 96.5	10-15-18	33	18	9.5			17.4	34	21			PP: >5.0 tsf
			SILTY SAND (SM); very dense; brown mottled with reddish brown; wet; some fines; medium SAND; few coarse SAND.															
205.99	100																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 5 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 101.5	26-41-38	79	18	17	26	127.1	10.3					
			CLAYEY SAND (SC); medium dense; brown mottled with dark gray; little grades to some fines; medium SAND; fine to coarse SAND; subangular to subrounded.															
200.99	105				SS-22	105.0 106.5	11-13-15	28	18	12			17.9	35	22			
			SANDY lean CLAY (CL); very stiff; brown variegated with dark gray; wet; some grades to little SAND.															
			Poorly graded SAND (SP); dense; yellowish brown; wet; trace fines; medium SAND.															
195.99	110				MC-23	110.0 111.5	48-45-31	76	18	11.5								Grades to SILTY SAND
			SILTY SAND (SM); dense; brown; wet; little grades to some fines; medium SAND; trace coarse SAND; subrounded; micaceous.															
190.99	115		- very dense; grayish brown mottled with brown; wet; little to some fines; fine SAND; interbedded and pockets of SANDY SILT (ML); micaceous.		SS-24	115.0 116.5	14-37-25	62	18	9	38							
			SANDY lean CLAY (CL); hard; brown variegated with dark gray; little SAND; fine SAND; high plasticity; high dry strength; no dilatancy; medium toughness.															
185.99	120																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 6 of 8

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				MC-25	120.0 121.5	13-21-24	45	18	16.5								PP: 5.0 tsf TV: 1.08 tsf
			SILTY SAND (SM); very dense; dark yellowish brown; wet; some fines; fine SAND; micaceous.															
180.99	125				SS-26	125.0 126.5	22-45-50/4.5"	95/10.5"	18	10								Rich in biotite and muscovite
175.99	130		- brown.		MC-27	130.0 131.5	20-31-37	98	18	16	35	116.0	16.2					Different SAND than above; high percentage of fines; upper bound of same
			Poorly graded SAND with SILT (SP-SM); very dense; light brown multicolored with light reddish brown and dark gray grains; wet; few fines; medium SAND; subangular to subrounded; micaceous.															
170.99	135				SS-28	135.0 135.9	43-50/5"	50/5"	11	7								Light brown; Munsell color 7.5YR/6/4; rich in biotite and muscovite
165.99	140																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 7 of 8	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-09-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2430150.592 / E6166301.825 (NAD83 CA Z5)	HOLE ID: S0078R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 305.99 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5 7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 150.8 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
140			SANDY lean CLAY (CL); hard; brown variegated with dark gray; wet; some SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; high toughness; micaceous.		MC-29	140.0 141.5	17-30-34	64	18	15.5									PP: 2.25 tsf TV: >5.0 tsf Sample reacts to vigorously with HCL
160.99	145		CLAYEY SAND (SC); dense; light brown laminated with reddish brown; wet; some fines; fine SAND; interbedded with SANDY lean CLAY (CL); hard; light brown; wet; some SAND; fine SAND; medium plasticity; high dry strength; high toughness (1" - 1/4" thick CL).		SS-30	145.0 146.5	14-26-22	48	18	11									
155.99	150		- very dense; brown; interbedded with pockets of SANDY lean CLAY (SC); brown; medium toughness; slow dilatancy.		MC-31	150.0 150.8	35-50/3.5"	50/3.5"	9.5	9.5									
150.99	155		Borehole terminated at a depth of 150.8' on 10/14/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
145.99	160																		

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0078R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 8 of 8	

Log|PIEZOMETER LOG 2/15/2012 11:00:17 AM

STANDPIPE PIEZOMETER INSTALLATION LOG

(continued)

PIEZOMETER NO.:

BORING NO.: **S0078R**

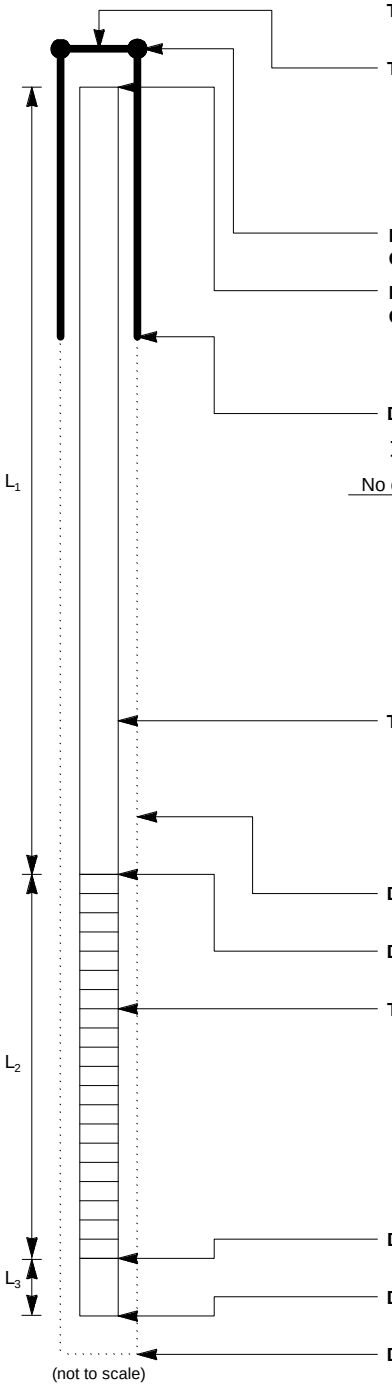
Project:	California High Speed Rail - Fresno to Bakersfield	**Project No.:**	131577-00
Location:	SR43 North of Poso Creek	**Project Mgr:**	M. Walker
Client:	California High Speed Rail Authority	**Field Eng. Staff:**	NG
Drilling Co.:	Gregg Drilling	**Date Installed:**	10/14/2013
Driller:	D. McMackin		

Ground El.: 305.99 ft.
Vertical Datum: NAVD 88

Boring Location:
N: 2430150.592 **E:** 6166301.825
Horizontal Datum: NAD 83 CA Z5

Well Cover:
☐ Guard Pipe ☒ Roadway Box
☐ Other:

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See corresponding borehole log for stratigraphy	Neat Cement Grout
	5-ft Bentonite Plug
	#3 Filter Sand



Total Number of Piezometers in Borehole: 1

Type of Protective Cover/Lock: Traffic-rated 2-hex bolt cover with padlock

Length: 1.5 ft.

Inside Diameter: 10.0 in.

Height/Depth of Cover Above/Below Ground Surface: 0.08 ft.

Height/Depth of Riser Pipe Above/Below Ground Surface: 0.33 ft.

Depth of Bottom of Casing: 0 ft.

Type of Seal	**Top of Seal (ft)**	**Thickness (ft)**
No casing installed		

Type of Riser Pipe: 2" PVC Sch 40 Riser

Inside Diameter of Riser Pipe: 2.0 in.

Type of Backfill Around Riser: Neat cement grout backfill above a 5.0 ft bentonite plug

Diameter of Borehole: 5.0 in.

Depth of Top of Well Screen: 90.0 ft.

Type of Screen: 2" PVC Sch 40 Screen

Screen Gauge or Size of Openings: 0.02 in.

Diameter of Screen: 2.0 in.

Type of Backfill Around Screen: #3 sand

Depth of Bottom of Well Screen: 115.0 ft.

Depth of Bottom of Silt Trap: 120.0 ft.

Depth of Bottom of Borehole: 150.8 ft.

150.8 ft. (Bottom of Exploration) 150.8 ft.

*Note: Numbers refer to depth from ground surface in feet
(+) = depth below ground surface
(-) = depth above ground surface

90.0 ft. Length of Riser (L_1)	+	25.0 ft. Length of Screen (L_2)	+	5.0 ft. Length of Silt Trap (L_3)	=	120.0 ft. Total Length

Comments: Sand type: CEMEX #3 sand, clean, graded, kiln dried, Monterey (50 lb bags)
Bentonite: EnviroPlug, medium, Wyo-Ben, Inc. (50 lb bags)
Cement: Basalite Type II-V cement, Portland cement (47 lb bags)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-25-13	COMPLETION DATE: Sep-16-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2426350.637 / E6165876.81 (NAD83 CA Z5)	HOLE ID: S0079R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 304.57 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SANDY SILT (ML); loose; brown; dry; some SAND; fine SAND.		B-01	0.0			60	60	63								COMP, RV Hand augered to 5.0' below ground surface (3" diameter)
299.57	5		SANDY SILT (ML/SM); stiff; light yellowish brown variegated with light gray; dry; some SAND; fine to medium SAND; weak to moderate cementation; calcite veins <1mm thick.		MC-02	5.0 6.5	4-11-13	24	18	14	50	102.7	14.0			UU 1861			Calcite vigorously reacted to 10% HCL DS
294.57	10		- very stiff.		SS-03	10.0 11.5	4-8-10	18	18	8	55								Calcite vigorously reacted to 10% HCL
289.57	15				MC-04	15.0 16.5	8-12-17	29	18	15		110.5	10.7						HCL reacted vigorously white calcite TXCD
284.57	20																		

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 6

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-25-13	COMPLETION DATE: Sep-16-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2426350.637 / E6165876.81 (NAD83 CA Z5)	HOLE ID: S0079R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 304.57 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		- little SAND; gray calcite partings.		SS-05	20.0 21.2	10-11-11	22	18	7	52							HCL fizzes vigorously with gray steaks/partings (Calcite)
279.57	25		- hard; strong cementation.		MC-06	25.0 26.5	11-20-35	55	18	14.5								HCL fizzes vigorously with gray partings
			SANDY SILT (ML); very stiff; light yellowish brown variegated with light gray; dry; little SAND; fine SAND; moderate cementation.															
274.57	30				SS-07	30.0 31.5	8-11-16	27	18	8	74							Calcite fizzed vigorously with HCL
269.57	35		- hard; some SAND; frequent calcite veins.		MC-08	35.0 36.5	16-24-31	55	18	16								
			SILTY SAND (SM); dense; brown; moist; some fines; fine grades to medium SAND; few coarse SAND (41.0'-41.5'); trace GRAVEL; fine GRAVEL.															
264.57	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 2 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-25-13	COMPLETION DATE: Sep-16-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2426350.637 / E6165876.81 (NAD83 CA Z5)	HOLE ID: S0079R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 304.57 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				SS-09	40.0 41.5	15-22-25	47	18	17	19							
259.57	45		- medium dense; dark yellowish brown; some fines; fine SAND.		MC-10	45.0 46.5	9-15-16	31	18	15.5		113.4	15.7					DS
254.57	50		SANDY lean CLAY (CL); hard; dark yellowish brown; variegated with dark gray; moist; some SAND; medium plasticity; medium dry strength; no dilatancy; low toughness; micaceous; occasional fissure parting (<1mm); dark gray.		SS-11	50.0 51.5	9-18-23	41	18	13			13.4	24	10			
249.57	55		SILTY SAND (SM/ML); dense; brown; moist; some fines; fine SAND; little medium SAND, trace coarse SAND; stratified with layers of SANDY SILT; micaceous.		MC-12	55.0 56.5	8-23-30	53	18	15								
244.57	60																	

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 3 of 6

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-25-13	COMPLETION DATE: Sep-16-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2426350.637 / E6165876.81 (NAD83 CA Z5)	HOLE ID: S0079R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 304.57 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		SILTY SAND (SM); very dense; grayish brown mottled with brown and reddish brown; moist; few fines; some medium SAND; some coarse SAND; some fine SAND; micaceous.		SS-13	60.0 61.5	25-27-36	63	18	12	14							
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
239.57	65					65.0 66.5	15-22-27	49	18	0								No sample recovered from 65.0'-66.5', the soil fell out of the sampler
					MC-14	67.0 68.5	14-17-27	44	18	14		108.4 110.6	17.2 19.1	29	11			Maxed out pocket pen all three times, tested the bottom of sample #2 TXCD PP: >5.0 tsf TV: 0.40 tsf
234.57	70		- very stiff; brown; fine SAND; high dry strength; no dilatancy; medium toughness.		SS-15	70.0 71.5	7-7-9	16	18	11								TV: 0.45, 0.35, 0.4 tsf
229.57	75		CLAYEY SAND (SC); dense; brown; moist; some fines; medium SAND.		MC-16	75.0 76.5	18-27-30	57	18	12								
			SANDY SILT (ML/SM); very dense; brown; moist; some SAND; medium SAND; subangular to subrounded; micaceous.															
224.57	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG / Sep-25-13 / Sep-16-13	N2426350.637 / E6165876.81 (NAD83 CA Z5)		S0079R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin			304.57 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-101.5')	D-1 (B53)		5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				SS-17	80.0 81.5	14-16-38	54	18	11	50							
219.57	85		Poorly graded SAND (SP); very dense; brown; moist; trace fines; medium SAND; angular to subrounded; micaceous.		MC-18	85.0 86.4	37-46-50/4.5"	96/ 10.5"	16.5	15								
214.57	90				SS-19	90.0 91.5	26-41-50	91	18	10.5								
209.57	95		SANDY SILT (ML); very stiff; brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; low toughness; strong cementation; blocky strongly cemented nodules; micaceous.		MC-20	95.0 96.5	11-17-26	43	18									Recovery not noted PP: 3.75, 4.75, 4.5, 3.75, 4.25 tsf TV: 0.95, 0.95, 1.0, 0.9 tsf
204.57	100		CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 6

CALIFORNIA High-Speed Rail Authority

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CALIFORNIA HIGH-SPEED TRAIN

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Sep-25-13	COMPLETION DATE: Sep-16-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2426350.637 / E6165876.81 (NAD83 CA Z5)	HOLE ID: S0079R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 304.57 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
100					SS-21	100.0 101.5	16-14-29	43	18	7								
199.57	105																	
194.57	110																	
189.57	115																	
184.57	120																	

Borehole terminated at a depth of 81.5' on 10/14/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0079R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 6 of 6

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-14-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2420976.083 / E6166087.024 (NAD83 CA Z5)	HOLE ID: S0080R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 312.3 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); medium dense; dark yellowish brown; dry; some SILT; [FILL].		B-01	0.0 5.0			60	60									COMP, RV, CBR, CORR
307.30	5		SANDY lean CLAY (CL); very stiff; brown; dry; little SAND; fine SAND.		SS-02	5.0 6.5	4-7-12	19	18	8				27	7				Reacts with HCL
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; little fines; fine SAND; few GRAVEL at top of sample. [NATIVE].																
302.30	10				MC-03	10.0 11.5	6-7-9	16	18	13		110.2	8.8						DS
			SANDY SILT (ML/SM); stiff; brown; moist; some SAND; fine SAND; micaceous.																
297.30	15				SS-04	15.0 16.5	4-6-8	14	18	9.5	50.5	98.5	14.5						
			Poorly graded SAND (SP); medium dense; brown mottled with gray, dark yellowish brown; trace fines; trace GRAVEL; coarse SAND.																
292.30	20																		

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0080R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 5

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-14-13	Oct-14-13	N2420976.083 / E6166087.024 (NAD83 CA Z5)	S0080R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				312.3 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-81.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	12-16-24	40	18	18		112.8	5.1					DS Fine SAND in shoe
			Poorly graded SAND with SILT (SP-SM); dense; multicolored grayish brown, gray brown, yellowish brown; moist; few fines; few GRAVEL; medium SAND; fine GRAVEL; layers of coarse SAND 25.5' to 26.0'.															
287.30	25				SS-06	25.0 26.5	8-14-18	32	18	16	6.8		11.6					
			Poorly graded SAND (SP); medium dense; light yellowish brown; moist; trace fines; fine to coarse SAND; subangular to subrounded.															
282.30	30				MC-07	30.0 31.5	11-20-26	46	18	13								
			SILTY SAND (SM); dense; dark yellowish brown; moist; little fines; fine SAND.															
277.30	35				SS-08	35.0 36.5	12-24-25	49	18	8.5								
			SANDY SILT (ML); hard; dark yellowish brown; moist; little CLAY; some SAND; fine SAND; no plasticity; high dry strength; low toughness; cemented seams.															
272.30	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0080R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	2 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-14-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2420976.083 / E6166087.024 (NAD83 CA Z5)	HOLE ID: S0080R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 312.3 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0 41.5	10-15-19	34	18	15	62.3							PP: 4.25, 4.5, 3.5 tsf TV: 0.23 tsf Reacts with HCL
267.30	45				SS-10	45.0 46.5	11-22-14	36	18	9.5	64.5		19.8					
262.30	50		- very stiff; brown variegated with reddish brown; little SAND; low plasticity; very high dry strength; micaceous.		MC-11	50.0 51.5	11-16-22	38	18	15		106.9	19.5					PP: 3.5 tsf TV: 0.38 tsf DS
			SILTY SAND (SM); medium dense; brown; moist; some fines; fine SAND; micaceous.															
257.30	55				SS-12	55.0 56.5	9-8-15	23	18	0	40.5		14.8					Recovery not noted
			Poorly graded SAND (SP); dense; yellowish brown/multicolored; moist; trace fines; fine to medium SAND; subrounded to rounded.															
252.30	60																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0080R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 3 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-14-13	COMPLETION DATE: Oct-14-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2420976.083 / E6166087.024 (NAD83 CA Z5)	HOLE ID: S0080R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 312.3 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	25-37-23	60	18	16		98.1	9.9					DS
247.30	65		SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine to medium SAND; micaceous.		SS-14	65.0 66.5	13-40-22	62	18	8.5								
242.30	70		- brown; fine SAND; weak cementation.		MC-15	70.0 71.5	16-33-47	80	18	16								Reacts with HCL
237.30	75		SANDY SILT (ML/SM); hard; brown; moist; some SAND; few CLAY; fine SAND; low plasticity; very high dry strength; low toughness; cemented seams.		SS-16	75.0 76.5	12-13-16	29	18	10	54.9							PP: 4.25 tsf Reacts with HCL
232.30	80		SANDY SILTY CLAY (CL-ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; very high dry strength; low toughness.															

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0080R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 4 of 5	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-14-13	COMPLETION DATE: Oct-14-13	HOLE ID: S0080R
BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2420976.083 / E6166087.024 (NAD83 CA Z5)			
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan	IN-SITU TESTING		SURFACE ELEVATION: 312.3 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')	DRILL RIG: M-10 (D44)		BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")	SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop		HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout	GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded		TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0	13-19-22	41	18	0									Recovery not noted PP: >5.0, >5.0, 4.25 tsf TV: 0.55 tsf
						81.5						110.2	20.1			UU 2050			
227.30	85																		
222.30	90																		
217.30	95																		
212.30	100																		

Borehole terminated at a depth of 81.5' on 10/14/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0080R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 5 of 5	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Oct-15-13	Oct-15-13	N2413732.424 / E6165944.119 (NAD83 CA Z5)	S0081R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin				320.7 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-81.5')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND with GRAVEL (SM); loose; brown; dry; little fines; medium SAND; medium to fine SAND; subangular; few GRAVEL with layers (2" thick) of Poorly graded SAND; [FILL].		B-01	0.0			60	60					NP				COMP, CORR, RV Hand augered to 5.0' below ground surface
			Poorly graded SAND (SP); loose; yellowish brown; dry; trace fines; medium SAND; [NATIVE].																
			SILTY SAND (SM); loose; brown; dry; little fines; medium SAND.			5.0													
315.70	5		- moist; some fines; fine SAND; trace medium SAND; subrounded.		SS-02	5.0 6.5	2-3-2	5	18	11.5	40.6	108.6	10.0						
310.70	10		- medium dense; yellowish brown with grayish mottling; some to little fines; weak cementation; stratified with SANDY SILT (ML).		MC-03	10.0 11.5	8-12-21	33	18	14		108.4	14.9						HCL reacts vigorously with gray/grayish cementation DS
			SANDY SILT (ML/SM); hard; yellowish brown variegated with gray; some SAND; fine to medium SAND; low plasticity; medium dry strength; slow dilatancy; low toughness; weak cementation.																
305.70	15				SS-04	15.0 16.5	3-3-5	8	18	9.5	52.7								PP: 5.0 tsf
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine SAND.																
300.70	20																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0081R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	1 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-15-13	COMPLETION DATE: Oct-15-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2413732.424 / E6165944.119 (NAD83 CA Z5)	HOLE ID: S0081R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 320.7 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	7-9-12	21	18	15.5		113.5	13.2					DS Fines increasing in depth
295.70	25				SS-06	25.0 26.5	5-7-13	20	18	11.5								CLAYEY slough materials
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; medium toughness.															
290.70	30				MC-07	30.0 31.5	17-15-16	31	18	15								Field strengths applicable at 31.5' PP: >5.0 tsf PP: >5.0, >5.0, >5.0 tsf TV: 2.5 tsf
			Poorly graded SAND (SP); medium dense; grayish brown mulitcolored with light reddish brown and dark gray; trace fines; medium SAND; subrounded; micaceous.															
			SANDY lean CLAY (CL); hard; brown with black mottling; little SAND; low plasticity.															
			Poorly graded SAND (SP); medium dense; grayish brown multicolored with light reddish brown and dark gray; trace fines; fine SAND; micaceous.															
285.70	35				SS-08	35.0 36.5	11-16-14	30	18	10								
			SILTY SAND (SM); medium dense; brown; moist; little fines; fine SAND; micaceous.															
			Poorly graded SAND (SP); medium dense; grayish brown; moist; trace fines; medium SAND; micaceous; statified with a 6" layer of SANDY CLAY (CL).															
280.70	40																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0081R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 2 of 5

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG / Oct-15-13 / Oct-15-13	N2413732.424 / E6165944.119 (NAD83 CA Z5)		S0081R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			320.7 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-81.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	81.5 ft

Elev (ft)	Depth (ft)	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40																
		Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown; moist; few fines; fine to medium SAND; subangular to subrounded; weak cementation; micaceous.		MC-09	40.0 41.5	15-15-26	41	18	14								PP: 3.75 tsf TV: 0.50 tsf Field strength tests run on bottom of 2 tube. CLAY layer from 40.7'-41.2'
275.70	45			SS-10	45.0 46.5	12-16-13	29	18	9	12.7		10.0					
		SANDY SILT (ML); very stiff; olive brown mottled with reddish brown and black; moist; some SAND; fine SAND; no plasticity; slow dilatancy; low toughness.															
270.70	50			MC-11	50.0 51.5	8-12-14	26	18	16		106.2	21.7	25	3	UU 1667		Possible organics PP: 4.75 tsf TV: 0.60 tsf
		SILTY SAND (SM); very dense; grayish brown; moist; little fines; fine SAND; micaceous.															
265.70	55			SS-12	55.0 56.5	12-22-40	62	18	12								
		Poorly graded SAND with SILT (SP-SM); dense; grayish brown; moist; few fines; trace GRAVEL; medium SAND; subrounded; micaceous.															
260.70	60																

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0081R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	3 of 5	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG	BEGIN DATE: Oct-15-13	COMPLETION DATE: Oct-15-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2413732.424 / E6165944.119 (NAD83 CA Z5)	HOLE ID: S0081R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 320.7 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	22-33-38	71	18	16	5.7		8.0					
			SILTY SAND (SM); very dense; yellowish brown multicolored with light reddish brown, gray and dark gray; moist; few to little fines; medium SAND; subangular to subrounded; micaceous.															
255.70	65				SS-14	65.0 66.5	17-28-22	50	18	11.5								Rich in biotite and muscovite
			SANDY SILT (ML); hard; brown variegated with dark brown; moist; little SAND; fine SAND; no plasticity; rapid dilatancy; low toughness.															
250.70	70				MC-15	70.0 71.5	18-18-25	43	18	11	67.5	100.5	22.2					PP: 5.0 tsf TV: 0.60 tsf DS
			SILTY SAND (SM/ML); very dense; grayish brown; moist; some fines; fine SAND; micaceous.															
245.70	75				SS-16	75.0 76.5	18-32-39	71	18	9.5	48.3		14.4					
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; medium SAND; subrounded; micaceous.															
240.70	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0081R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Oct-15-13	Oct-15-13	N2413732.424 / E6165944.119 (NAD83 CA Z5)	S0081R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin				320.7 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-81.5')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0 81.5	31-44-47	91	18	15								
235.70	85																	
230.70	90																	
225.70	95																	
220.70	100																	

Borehole terminated at a depth of 81.5' on 10/15/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0081R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 5

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; dark yellowish brown; moist; some fines; fine SAND; micaceous; [NATIVE].		B-01	0.0			60	60	36.9		10.3					COMP, RV Hand augered to 5.0' below ground surface
323.27	5					5.0												
					SS-02	5.0	3-3-3	6	18	8								
						6.5					43.3		11.5					DS
			Poorly graded SAND with SILT (SP-SM); medium dense; dark yellowish brown; moist; few fines; fine SAND; micaceous.															
318.27	10				MC-03	10.0	5-7-12	19	18	11								
			CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; some CLAY; fine SAND; micaceous.			11.5												
			Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown; moist; few fines; medium SAND; micaceous.															
313.27	15				SS-04	15.0	7-8-8	16	18	11								Grayish brown predominant, also had yellows, gray, etc
						16.5					10		7.6					
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine to medium SAND with trace coarse SAND; micaceous.															
308.27	20																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	D. Maggi		5-14-14	1 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0	8-11-20	31	18	16								Gravel in slough
						21.5						119.6	12.8					DS
			SILTY SAND (SM/ML); medium dense; yellowish brown; moist; some fines; fine SAND; micaceous.															
303.27	25				SS-06	25.0	8-10-8	18	18	7.5								
						26.5					46.7		15.5					
			SILTY SAND (SM); medium dense; dark yellowish brown; some fines; fine SAND; micaceous.															
298.27	30				MC-07	30.0	12-17-21	38	18	14								
						31.5						103.1	10.1					DS
293.27	35		- very dense; grayish brown.		SS-08	35.0	15-26-30	56	18	11								
						36.5												
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; little fines; fine SAND; micaceous.															
288.27	40																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	2 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0 41.3	16-42-50/4"	92/10"	16	15								
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some fines; some SILT; fine SAND; low plasticity; high dry strength; low toughness; micaceous.															
283.27	45				SS-10	45.0 46.5	6-14-14	28	18	10				31	13			
278.27	50				MC-11	50.0 51.5	14-22-42	64	18	15		117.9	15.6			UU 3635		PP: 4.5, 3.5, 3.25 tsf TV: 0.175 tsf
			SILTY SAND (SM); dense; grayish brown; moist; some fines; fine SAND; micaceous.															
			SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some SILT; some CLAY; fine SAND; low plasticity; high dry strength; low toughness; micaceous.															
273.27	55				SS-12	55.0 56.5	10-30-50/4"	80/10"	16	10								
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; little SILT; fine SAND; trace coarse SAND; micaceous.															
268.27	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	3 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		SANDY SILT (ML); very stiff; dark yellowish brown variegated with reddish brown; moist; some SAND; fine SAND; low plasticity; very high dry strength; slow dilatancy; low toughness; micaceous.		MC-13	60.0 61.5	12-21-34	55	18	14.5		113.4	16.2					PP: 3.0, 3.25, 3.5 tsf TV: 0.25, 0.20 tsf DS
			SILTY SAND (SM); very dense; grayish brown; moist; some fines; fine SAND with few medium SAND; weak cementation; micaceous.															
263.27	65				SS-14	65.0 66.5	24-44-50	94	18	8.5								
			CLAYEY SAND (SC); very dense; dark yellowish brown; moist; some CLAY; fine SAND; micaceous.															
258.27	70				MC-15	70.0 71.5	11-43-39	82	18	11.5								
			SANDY SILT (ML); very stiff; brown with calcified veins; moist; some SAND; fine SAND; micaceous.															
253.27	75				SS-16	75.0 76.5	11-12-10	22	18	0	55.2			30	7			Recovery not noted
248.27	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	4 of 8	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80		- hard; dark yellowish brown; little SAND; no plasticity.		MC-17	80.0 81.4	20-45-53/5"	98/11"	17	16								
			SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
243.27	85				SS-18	85.0 86.5	16-20-20	40	18	5.5								
238.27	90		- very dense.		MC-19	90.0 91.4	25-44-50/5"	94/11"	17	12								
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; fine SAND; micaceous.															
233.27	95				SS-20	95.0 95.8	25-50	50/4"	10	6.5								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
228.27	100																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

URS | HMM | ARUP

REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	5 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 101.5	16-31-53	84	18	17.5		117.8	14.0					DS
223.27	105		- little fines; moderate cementation.		SS-22	105.0 105.8	42-50	50/3"	9	0								Recovery not noted
218.27	110		- some SILT. SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some fines; some SAND; fine SAND; low plasticity; high dry strength; low toughness; micaceous.		MC-23	110.0 111.5	17-36-44	80	18	16								
213.27	115		- very stiff; medium plasticity. SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.		SS-24	115.0 116.5	19-41-43	84	18	9.5								PP: 4.0, 4.0, 3.5 tsf
208.27	120																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	6 of 8	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Nov-06-13 / Nov-08-13	N2407455.314 / E6165175.919 (NAD83 CA Z5)		S0082R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/E. Santellan/D. Heavilin	PS Logging		328.27 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-158')	D44 (M-10) and D20 (V-100)		4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		85/Unknown
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120		- very dense; trace medium SAND.		MC-25	120.0 121.5	15-24-37	61	18	17								
203.27	125																	At 125', switched drill rigs to rig #D20. No hammer energy calibration performed. D20 equipped with AWJ rods
198.27	130		- medium SAND; subangular; weak cementation.		SS-26	130.0 131.5	32-30-75/5.5"	105/11.5"	17.5	9								High blow counts allowed due to low hammer efficiency. Rods were flexing with each blow.
193.27	135																	Drilled fast from 136.5' to 139.0' bgs
188.27	140																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	D. Maggi	5-14-14	7 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV/NG	BEGIN DATE: Nov-06-13	COMPLETION DATE: Nov-08-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2407455.314 / E6165175.919 (NAD83 CA Z5)	HOLE ID: S0082R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan/D. Heavilin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 328.27 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-158')			DRILL RIG: D44 (M-10) and D20 (V-100)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85/Unknown
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 158 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
140			- fine SAND; with pockets of SANDY SILT; hard; dark yellowish brown; low plasticity.		MC-27	140.0 141.5	28-56-77	133	18	15								
183.27	145		SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; low toughness.															
178.27	150				SS-28	150.0 151.5	10-13-18	31	18	16								Drilled rathole for PS logging down to 158.0' bgs.
173.27	155																	
168.27	160		Borehole terminated at a depth of 158.0' on 11/8/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.															

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0082R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi	DATE: 5-14-14	SHEET: 8 of 8	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402675.734 / E6165441.701 (NAD83 CA Z5)	HOLE ID: S0083R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 331.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; dark yellowish brown; dry; some fines; fine SAND; micaceous [FILL].		B-01	0.0			60	60									COMP, RV Hand augered to 5.0' below ground surface
326.88	5		- medium dense.		SS-02	5.0 6.5	5-8-6	14	18	8.5	36.9		10.4						Dark layer probably asphalt material
			SILTY SAND (SM); medium dense; dark yellowish brown; dry; some fines; fine SAND; weak cementation; micaceous.																
321.88	10				MC-03	10.0 11.5	12-23-18	42	18	14		121.0	8.0						Cemented nodules react with HCL DS
316.88	15		- dense.		SS-04	15.0 16.5	9-16-17	33	18	9.5									
			Well graded SAND with SILT (SW-SM); dense; grayish brown; few fines; trace GRAVEL; medium SAND; fine GRAVEL; micaceous.																
311.88	20																		

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi	DATE: 5-14-14	SHEET: 1 of 8	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402675.734 / E6165441.701 (NAD83 CA Z5)	HOLE ID: S0083R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 331.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0	11-17-20	37	18	15	6.6	122.8	12.7					
			SANDY SILTY CLAY (CL-ML/SM); hard; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; very high dry strength; low toughness; micaceous.			21.5												PP: >4.5, >4.5, >4.5 tsf TV: .15 tsf
306.88	25				SS-06	25.0	13-22-25	47	18	8.5	51.6		11.2	24	5			
						26.5												
			Poorly graded SAND with SILT (SP-SM); dense; dark yellowish brown; moist; few fines; medium to coarse SAND; trace fine GRAVEL.															
301.88	30				MC-07	30.0	18-22-28	50	18	16.5		116.5	6.5					DS
						31.5												
			CLAYEY SAND (SC); dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
296.88	35				SS-08	35.0	8-13-16	29	18	10	35.5							Fine gravel in sloughed materials
						36.5												
291.88	40																	

(continued)

REPORT TITLE: BORING RECORD				HOLE ID: S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi		DATE: 5-14-14	SHEET: 2 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402675.734 / E6165441.701 (NAD83 CA Z5)	HOLE ID: S0083R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 331.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few fines; fine SAND; micaceous.		MC-09	40.0 41.0	34-60	60/6"	12	12								
			SANDY CLAY (CL); very stiff; dark yellowish brown variegated with dark brown; moist; some SAND; fine SAND; medium plasticity; very high dry strength; medium toughness; SILTY.															
286.88	45				SS-10	45.0 46.5	7-8-15	23	18	9.5								PP: 3.0, 3.7, 4.0 tsf
			Poorly graded SAND (SP-SM); medium dense; dark yellowish brown; moist; trace fines; fine SAND; micaceous.															
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; very high dry strength; low toughness; micaceous.															
281.88	50		- dark yellowish brown variegated with dark brown.		MC-11	50.0 51.5	11-17-40	57	18	15		111.2	15.5			UU 2640		PP: 4.25, 4.25, 2.25 tsf TV: .20 tsf Sample grades increasing sand with depth
276.88	55				SS-12	55.0 56.5	9-12-23	35	18	9.5								PP: 4.0, >4.5, >4.5 tsf
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
271.88	60																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi	DATE: 5-14-14	SHEET: 3 of 8	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402675.734 / E6165441.701 (NAD83 CA Z5)	HOLE ID: S0083R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 331.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	35-35-37	72	18	13								Moist - probably drilling fluid
266.88	65		- dense; grading to medium to coarse SAND with depth.		SS-14	65.0 66.5	21-27-17	44	18	7.5								1/2" layer of black (~66.0') to gray at shoe
261.88	70		- mottled with reddish brown; some fines; fine SAND; fine to coarse SAND; interbedded with SANDY SILT (ML); dark yellowish brown; moist; some SAND; no plasticity; medium dry strength; low toughness.		MC-15	70.0 71.5	14-19-36	55	18	17								
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; medium SAND; fine to coarse SAND; subrounded to rounded.															Estimated silt thickness is 3"
256.88	75				SS-16	75.0 76.3	26-50-50/3.5"	100/9.5"	15.5	11								
			SILTY SAND (SM); dense; dark brown variegated with dark yellowish brown; moist; little fines; medium SAND; moderate cementation.															
251.88	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi		DATE: 5-14-14	SHEET: 4 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-29-13	Oct-30-13	N2402675.734 / E6165441.701 (NAD83 CA Z5)	S0083R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				331.88 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer			Not Recorded / Not Recorded	151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0 81.5	31-35-33	68	18	15		117.6	13.9					By shoe, fully SM DS
246.88	85		- very dense; dark yellowish brown variegated with dark brown; some fines; fine to medium SAND; micaceous.		SS-18	85.0 86.5	12-19-34	53	18	12	39.6		10.7					
241.88	90		- dark yellowish brown; little fines; trace fine GRAVEL; medium SAND; rounded to subrounded.		MC-19	90.0 90.9	30-50	50/5"	11	11								
			Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few fines; medium to coarse SAND; rounded to subrounded; micaceous.															
236.88	95				SS-20	95.0 95.9	19-50	50/5"	11	11								
231.88	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	D. Maggi		5-14-14	5 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-29-13	Oct-30-13	N2402675.734 / E6165441.701 (NAD83 CA Z5)	S0083R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				331.88 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer			Not Recorded / Not Recorded	151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100		- dark yellowish brown to grayish brown; little GRAVEL; coarse SAND.		MC-21	100.0 101.0	33-50	50/6"	12	9		113.8	11.9					Lots of gravel (per driller) - shoe mostly empty DS
			Poorly graded SAND (SP); very dense; dark yellowish brown; moist; trace fines; coarse to fine SAND; rounded to subrounded; micaceous.															
226.88	105				SS-22	105.0 106.0	25-50	50/6"	12	12								Dry soil sample in shoe
			SANDY SILTY CLAY (CL-ML); hard; brown; moist; some SAND; some SILT; fine SAND; low plasticity; high dry strength; low toughness; micaceous.															
221.88	110				MC-23	110.0 111.5	19-36-46	82	18	15		112.0	17.2			UU 10440		PP: >4.5, 4.25, 3.0 tsf TV: .30 tsf
216.88	115		- low to medium plasticity; very high dry strength.		SS-24	115.0 116.5	11-10-16	26	18	11								PP: >4.5, >4.5, >4.5 tsf
			Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; little fines; fine SAND; micaceous.															
211.88	120																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	D. Maggi		5-14-14	6 of 8

CALIFORNIA High-Speed Rail Authority

URS | HMM | ARUP

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402675.734 / E6165441.701 (NAD83 CA Z5)	HOLE ID: S0083R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 331.88 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				MC-25	120.0 120.3	50	50/ 4"	4	4								Probably wet - GW?
			SANDY lean CLAY (CL); hard; brown variegated with dark brown; moist; little SAND; fine SAND; micaceous.															
206.88	125				SS-26	125.0 126.5	22-21-34	55	18	8								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
201.88	130				MC-27	130.0 130.8	50-50	50/ 3.5"	9.5	9.5								
196.88	135				SS-28	135.0 136.3	20-30-50	80/ 10"	16	10								Considerably less silt in shoe
191.88	140																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: D. Maggi	DATE: 5-14-14	SHEET: 7 of 8	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-29-13	Oct-30-13	N2402675.734 / E6165441.701 (NAD83 CA Z5)	S0083R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				331.88 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer			Not Recorded / Not Recorded	151.5 ft

Elevation (ft)	Depth (ft)	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	Remarks/ Other Tests
	140	- variegated with streaks of black; some fines; fine SAND.		MC-29	140.0	48-50-50/5.5"	100/11.5"	17.5	17	
		SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND; low plasticity; high dry strength; low toughness; micaceous.			141.5					
		CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND; cemented veins; micaceous.								
186.88	145			SS-30	145.0	15-18-15	33	18	8.5	Cementation reacts with HCL
		SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND; cemented veins; micaceous.			146.5					
		SANDY SILTY CLAY (CL-ML); hard; brown variegated with dark brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; medium toughness; micaceous.								
181.88	150			MC-31	150.0	14-19-33	52	18	18	PP: 3.25, 3.5, 3.25 tsf TV: .56 tsf
					151.5					
176.88	155									
171.88	160									

Borehole terminated at a depth of 151.5' on 10/30/2013. Piezometer installed on 11/31/13.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

Material Graphics | Dry Density (pcf) | Moisture Content (%) | Liquid Limit (%) | Plasticity Index (%) | TXUU (psf) | Drilling Method / Casing Depth

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0083R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	D. Maggi		5-14-14	8 of 8

Log|PIEZOMETER LOG 2/15/2012 11:00:17 AM

STANDPIPE PIEZOMETER INSTALLATION LOG

(continued)

PIEZOMETER NO.:

BORING NO.: **S0083R**

Project:	California High Speed Rail - Fresno to Bakersfield	**Project No.:**	131577-00
Location:	Poso and G Streets	**Project Mgr:**	M. Walker
Client:	California High Speed Rail Authority	**Field Eng. Staff:**	SV
Drilling Co.:	Gregg Drilling	**Date Installed:**	10/31/2013
Driller:	E. Santellan		

Ground El.: 331.88 ft.

Vertical Datum: NAVD 88

Boring Location:

N: 2402675.734 **E:** 6165441.701

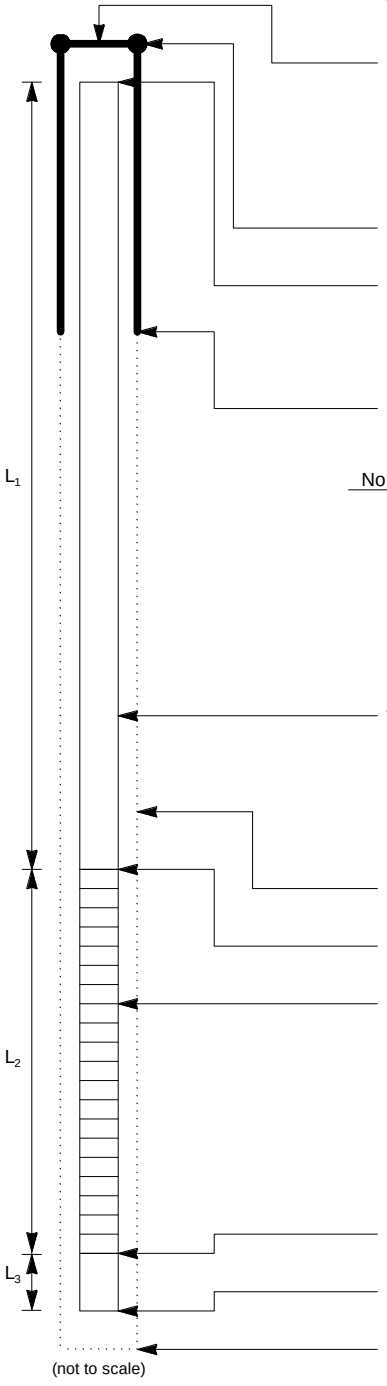
Horizontal Datum: NAD 83 CA Z5

Well Cover:

☐ Guard Pipe ☒ Roadway Box

☐ Other:

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See corresponding borehole log for stratigraphy	Neat Cement Grout
	5-ft Bentonite Plug
	#3 Filter Sand



Total Number of Piezometers in Borehole: 1

Type of Protective Cover/Lock: Traffic-rated 2-hex bolt cover with padlock

Length: 1.0 ft.

Inside Diameter: 10.0 in.

Height/Depth of Cover Above/Below Ground Surface: 0.0 ft.

Height/Depth of Riser Pipe Above/Below Ground Surface: 0.25 ft.

Depth of Bottom of Casing: 1 ft.

Type of Seal	**Top of Seal (ft)**	**Thickness (ft)**
No casing installed		

Type of Riser Pipe: 2" PVC Sch 40 Riser

Inside Diameter of Riser Pipe: 2.0 in.

Type of Backfill Around Riser: Neat cement grout backfill above a 5.0 ft bentonite plug

Diameter of Borehole: 6.0 in.

Depth of Top of Well Screen: 96.0 ft.

Type of Screen: 2" PVC Sch 40 Screen

Screen Gauge or Size of Openings: 0.02 in.

Diameter of Screen: 2.0 in.

Type of Backfill Around Screen: #3 sand

Depth of Bottom of Well Screen: 126.0 ft.

Depth of Bottom of Silt Trap: 126.5 ft.

Depth of Bottom of Borehole: 151.5 ft.

151.5 ft. (Bottom of Exploration) 151.5 ft.

*Note: Numbers refer to depth from ground surface in feet
(+) = depth below ground surface
(-) = depth above ground surface

96.0 ft.	+	30.0 ft.	+	0.5 ft.	=	126.5 ft.
Length of Riser (L_1)		Length of Screen (L_2)		Length of Silt Trap (L_3)		Total Length

Comments: Sand type: CEMEX #3 sand, clean, graded, kiln dried, Monterey (50 lb bags)

Bentonite: EnviroPlug, medium, Wyo-Ben, Inc. (50 lb bags)

Cement: Basalite Type II-V cement, Portland cement (47 lb bags)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: SV	BEGIN DATE: Nov-04-13	COMPLETION DATE: Nov-04-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402736.505 / E6165745.834 (NAD83 CA Z5)	HOLE ID: S0084AR
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING:	SURFACE ELEVATION: 332.78 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; dry; some fines; micaceous.		B-01	0.0			60	60									CBR, COMP Hand augered to 5.0' below ground surface.
327.78	5		- moist; fine SAND.		SS-02	5.0 6.5	2-2-3	5	18	9.5	44								
322.78	10		- medium dense; little fines; micaceous.		MC-03	10.0 11.5	4-6-9	15	18	11.5	23	90.0	34.7						DS
			Well graded SAND with SILT (SW-SM); medium dense; brown grades to grayish brown; moist; few fines; fine SAND; micaceous.																
317.78	15		- brown to grayish brown (w/depth).		SS-04	15.0 16.5	6-10-12	22	18	10	10								Fine GRAVEL in sloughed material
			Poorly graded SAND (SP); medium dense; grayish brown; moist; trace fines; fine SAND; micaceous.																
312.78	20																		

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 7

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Nov-04-13	COMPLETION DATE: Nov-04-13	HOLE ID: S0084AR
BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402736.505 / E6165745.834 (NAD83 CA Z5)			
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan	IN-SITU TESTING		SURFACE ELEVATION: 332.78 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')	DRILL RIG: M-10 (D44)		BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")	SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop		HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout	GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded		TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	10-11-17	28	18	13								
			SILTY SAND (SM); medium dense; brown; moist; some fines; fine to medium SAND; micaceous.															
307.78	25		- dense; grayish brown; little fines; fine SAND; weak cementation.		SS-06	25.0 26.5	9-19-12	31	18	9	16							
302.78	30		- grayish brown variegated with reddish brown; some fines.		MC-07	30.0 31.5	1-14-20	34	18	15.5		105.0	11.3					DS
297.78	35		- brown.		SS-08	35.0 36.5	8-16-19	35	18	0	44							No recovery noted
292.78	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 2 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Nov-04-13	COMPLETION DATE: Nov-04-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2402736.505 / E6165745.834 (NAD83 CA Z5)	HOLE ID: S0084AR
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 332.78 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		- medium dense; cemented nodules <1/2".		MC-09	40.0 41.5	9-13-28	41	18	14.5								Cementation reacts vigorously with 10% HCL
			SANDY SILT (ML); very stiff; grayish brown; moist; some SAND; fine SAND; low to no plasticity; very high dry strength; low toughness; micaceous.															
287.78	45				SS-10	45.0 46.5	10-6-6	12	18	5.5	57							PP: 3.0, 2.75 tsf
			SILTY SAND (SM); dense; yellowish brown variegated with reddish brown; moist; some fines; fine SAND; weak cementation; micaceous.															
282.78	50				SS-11	50.0 51.5	7-15-19	34	18	10								
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; very high dry strength; medium toughness; micaceous.															
277.78	55				MC-12	55.0 56.5	7-10-13	23	18	14.5			24.1	37	21			PP: 2.5, 2.5, 2.75 tsf TV: .25, .18 tsf
272.78	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 3 of 7	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-04-13	Nov-04-13	N2402736.505 / E6165745.834 (NAD83 CA Z5)	S0084AR
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				332.78 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		SILTY SAND (SM); medium dense; yellowish brown variegated with reddish brown; moist; some fines; fine SAND; micaceous.		MC-13	60.0 61.5	8-15-22	37	18	15								Material in #3 at 2/3 boundary appears to be the same as above
			SANDY SILT (ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; no plasticity; very high dry strength; low toughness; micaceous.															
267.78	65				SS-14	65.0 66.5	11-9-10	19	18	9.5	75							SILTY SAND; seam of fine gray SAND PP: 3.5, 2.75, 2.75 tsf
			Poorly graded SAND with SILT (SP-SM); very dense; brown variegated with dark brown reddish brown; moist; little fines; fine SAND; micaceous.															
262.78	70				MC-15	70.0 71.3	15-28-50/4"	78/10"	16	15		122.3	11.8					DS
			SILTY SAND (SM); very dense; brown; moist; little fines; fine SAND; micaceous.															
257.78	75				SS-16	75.0 75.9	37-50	50/4.5"	10.5	6.5								
			Poorly graded SAND with SILT (SP-SM); very dense; brown variegated with dark brown reddish brown; moist; few fines; medium SAND; micaceous.															
252.78	80																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

URS | HMM | ARUP

REPORT TITLE				HOLE ID
BORING RECORD				S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	4 of 7

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-04-13	Nov-04-13	N2402736.505 / E6165745.834 (NAD83 CA Z5)	S0084AR
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				332.78 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0 81.5	29-43-54	97	18	16.5								
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; very high dry strength; medium toughness; micaceous.															
247.78	85				SS-18	85.0 86.5	11-14-16	30	18	11.5			14.9	31	17			PP: >5.0, >5.0 tsf
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
242.78	90				MC-19	90.0 91.0	37-55	55/6	12	10.5								
			Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few fines; fine SAND; micaceous.															
237.78	95				SS-20	95.0 96.3	10-25-57/4"	82/10"	16	13.5								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous; trace fine GRAVEL.															
232.78	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-04-13	Nov-04-13	N2402736.505 / E6165745.834 (NAD83 CA Z5)	S0084AR
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				332.78 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 101.5	21-41-49	90	18	17		121.7	13.4					DS
			SANDY SILT (ML); hard; dark yellowish brown; moist; some SAND; some fines; fine SAND; low plasticity; very high dry strength; low to medium toughness; micaceous.															
227.78	105				SS-22	105.0 106.5	11-18-43	61	18	12	68							PP: 4.25, 3.0, >5.0 tsf
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
222.78	110				MC-23	110.0 110.8	35-50	50/4"	10	8.5								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; little fines; strong cementation; micaceous.															
217.78	115				SS-24	115.0 116.5	9-18-37	55	18	16								
			SANDY SILTY CLAY (CL-ML); hard; brown variegated with black; moist; some SILT; some SAND; fine SAND; low plasticity; high dry strength; low toughness; micaceous.															
212.78	120																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	6 of 7

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-04-13	Nov-04-13	N2402736.505 / E6165745.834 (NAD83 CA Z5)	S0084AR
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				332.78 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	120				MC-25	120.0 121.5	24-30-46	76	18	16									PP: >5.0, >5.0, 4.5 tsf TV: .20 tsf
			SILTY SAND (SM); dense; brown; moist; some fines; fine SAND; interbedded with layeres of SANDY SILT (ML); hard; low plasticity; brown varigated with black; micaceous.																
207.78	125				SS-26	125.0 126.5	29-28-19	47	18	5.5									
			SANDY SILT (ML); hard; dark yellowish brown; moist; some SAND; fine SAND; no plasticity; micaceous.																
202.78	130				MC-27	130.0 131.5	12-25-40	65	18	16									
			Borehole terminated at a depth of 131.5' on 11/4/2013.																
			Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.																
197.78	135		See Borehole Log Legend for soil classification chart and key to test data and sampler type.																
192.78	140																		

REPORT TITLE				HOLE ID
BORING RECORD				S0084AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	7 of 7

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-28-13	COMPLETION DATE: Oct-29-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2397299.335 / E6165829.958 (NAD83 CA Z5)	HOLE ID: S0084R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 337.05 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), SS			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; dry; some fines; fine SAND; few medium SAND; micaceous; [FILL].		B-01	0.0			60	60									CBR, COMP, RV Hand augered to 5.0' below ground surface
			SILTY SAND (SM); loose; brown; dry; little fines; medium SAND; micaceous; [NATIVE].			5.0													
332.05	5				SS-02	5.0	2-4-5	9	18	14									
						6.5					17.4		2.8						
			Well graded SAND with SILT (SW-SM); medium dense; brown; moist; few fines, trace GRAVEL; fine GRAVEL; medium SAND.																
327.05	10				MC-03	10.0	5-9-12	21	18	15									
						11.5					6	107.6	4.1						DS
			SANDY lean CLAY (CL); hard; dark yellowish brown; dry; little SAND; fine SAND; moderately cemented seams.																
322.05	15				SS-04	15.0	7-10-10	20	18	5									
						16.5					77.7								PP: >5.0, >5.0 tsf
			SILTY SAND (SM); medium dense; dark yellowish brown; dry; some fines; medium SAND; micaceous.																Cementation reacts vigorously with 10% HCL
317.05	20																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 1 of 7	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-28-13	COMPLETION DATE: Oct-29-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2397299.335 / E6165829.958 (NAD83 CA Z5)	HOLE ID: S0084R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 337.05 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), SS			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	6-11-12	23	18	15		106.7	7.8					DS
312.05	25		- weak cementation.		SS-06	25.0 26.5	9-11-9	20	18	8.5								
			Poorly graded SAND with SILT (SP-SM); medium dense; dark yellowish brown; dry; few fines; fine SAND; micaceous; blocky with SILTY CLAY <1/2" diameter.															
307.05	30				MC-07	30.0 31.5	9-14-19	33	18	18		115.0	9.7					DS
			CLAYEY SAND (SC-CL); medium dense; dark yellowish brown; moist; some fines; medium to fine SAND.															
302.05	35				SS-08	35.0 36.5	6-6-9	15	18	6	48		11.4					
297.05	40																	

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 7	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-28-13	Oct-29-13	N2397299.335 / E6165829.958 (NAD83 CA Z5)	S0084R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				337.05 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), SS			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		SANDY SILT (ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; high dry strength; low toughness; lensed with SILTY SAND; micaceous.		MC-09	40.0 41.5	11-19-13	32	18	15		113.3	15.0					PP: 3.5, 4.25, 3.75 tsf TV: .13 tsf TXCD
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
292.05	45				SS-10	45.0 46.5	9-10-9	19	18	7								
			SANDY SILTY CLAY (CL-ML); very stiff; dark yellowish brown variegated with dark brown; moist; some SAND; fine SAND; medium to low plasticity; very high dry strength; low toughness; micaceous.															
287.05	50				MC-11	50.0 51.5	6-10-15	25	18	15		104.4	20.6	36	22	UU 2428		PP: 2.25, 2.75, 2.0 tsf TV: .25 tsf
			CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
282.05	55				SS-12	55.0 56.5	6-8-21	29	18	11								
			Poorly graded SAND with SILT (SP-SM); medium dense; dark yellowish brown; moist; little fines; fine to medium SAND; micaceous.															
277.05	60																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Oct-28-13	Oct-29-13	N2397299.335 / E6165829.958 (NAD83 CA Z5)	S0084R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				337.05 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-131.5')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), SS			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		SILTY SAND (SM); dense; dark yellowish brown; some fines; medium SAND; subangular to subrounded; interbedded with SANDY CLAY; micaceous.		MC-13	60.0 61.5	19-25-36	61	18	16		118.3	10.3					DS
272.05	65		- very dense; some fines; medium SAND; strong cementation.		SS-14	65.0 66.3	21-57-53	110/ 9"	15	15	26.2		7.3					No recovery noted
			Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few fines; medium SAND; micaceous.															
267.05	70				MC-15	70.0 71.3	33-55	55/ 4"	16	10		123.6	10.1					DS
			SILTY SAND (SM); very dense; brown; some fines; fine SAND; weak cementation.															
262.05	75				SS-16	75.0 76.4	24-53-54/5"	107/ 11"	17	9								
257.05	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	4 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-28-13	COMPLETION DATE: Oct-29-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2397299.335 / E6165829.958 (NAD83 CA Z5)	HOLE ID: S0084R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 337.05 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), SS			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80		- dark yellowish brown; moist; some fines; fine SAND; micaceous.		MC-17	80.0 81.3	20-42-53/3"	95/9"	15	15	22.5	125.9	9.3					
252.05	85		- dense.		SS-18	85.0 86.5	15-19-29	48	18	10								
247.05	90		- very dense.		MC-19	90.0 90.8	51-50	50/4"	10	10								
			SILTY SAND (SM); very dense; dark yellowish brown variegated with dark gray; moist; little fines; medium to coarse SAND.															
242.05	95				SS-20	95.0 96.0	31-55	55/6"	12	8	17.6		13.1					
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
237.05	100																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 5 of 7

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-28-13	COMPLETION DATE: Oct-29-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2397299.335 / E6165829.958 (NAD83 CA Z5)	HOLE ID: S0084R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 337.05 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), SS			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 101.4	15-46-50/5"	96/11"	17	12								
			Poorly graded SAND (SP); very dense; dark yellowish brown; moist; trace fines; medium SAND; micaceous.															
232.05	105		Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few to little fines; medium SAND.		SS-22	105.0 106.3	31-50	50/4"	16	8								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; medium SAND; micaceous.															
227.05	110				MC-23	110.0 110.8	48-50	50/4"	10	10		113.6	8.9					DS
222.05	115		- dense; fine SAND.		SS-24	115.0 116.5	24-19-18	37	18	6								
217.05	120																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 6 of 7	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Oct-28-13	COMPLETION DATE: Oct-29-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2397299.335 / E6165829.958 (NAD83 CA Z5)	HOLE ID: S0084R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 337.05 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-131.5')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), SS			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 131.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	120		- very dense; medium SAND; micaceous.		MC-25	120.0 120.3	50	50/ 4"	4	4									
			Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; little fines; medium SAND; micaceous.																
212.05	125				SS-26	125.0 125.8	46-50	50/ 3.5"	9.5	9.5									No recovery noted
			SANDY lean CLAY (CL); hard; brown; moist; some SAND; fine SAND; medium plasticity; low toughness.																
207.05	130				MC-27	130.0 131.4	25-43-50/5"	93/ 11"	17	14									PP: >5.0, >5.0, >5.0 tsf TV: .23 tsf
			Borehole terminated at a depth of 131.5' on 10/28/2013.																
			Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.																
202.05	135		See Borehole Log Legend for soil classification chart and key to test data and sampler type.																
197.05	140																		

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0084R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 7 of 7	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Oct-25-13 / Oct-28-13	N2378461.834 / E6175843.037 (NAD83 CA Z5)		S0085R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			345 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; dark yellowish brown; dry; some fines; fine SAND; [FILL].		B-01	0.0			60	60								COMP, RV Hand augered to 5.0' below ground surface; 4 7/8" bit used to 30.0'
			SILTY SAND (SM); very loose; dark yellowish brown; moist; some fines; medium SAND.			5.0												
340.00	5				MC-02	5.0	1-3-4	7	18	18								
						6.5						115.2	9.0					DS
			Poorly graded SAND with GRAVEL (SP); loose; grayish brown; moist; little GRAVEL; trace fines; medium SAND; fine GRAVEL.															
335.00	10				SS-03	10.0	4-3-3	6	18	9.5								
						11.5					3.5		13.9					
			Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown; moist; few fines; medium SAND.															
330.00	15				MC-04	15.0	11-12-16	28	18	13								
						16.5						119.3	7.7					DS
			SANDY SILTY CLAY (CL-ML); stiff; brown; moist; some SILT; some SAND; fine SAND; medium plasticity; high dry strength; low toughness.															
325.00	20																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	1 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: SV/NG	BEGIN DATE: Oct-25-13	COMPLETION DATE: Oct-28-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2378461.834 / E6175843.037 (NAD83 CA Z5)	HOLE ID: S0085R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 345 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				SS-05	20.0 21.2	5-17-14	31	18	0	70.1	106.4	14.2					PP: 1.5, 1.0, 2.0 tsf
			Poorly graded SAND with SILT (SP-SM); medium dense; strong brown; moist; few fines; medium SAND; subrounded; strong cementation.															Gravel in slough
320.00	25				MC-06	25.0 26.5	17-14-13	27	18	13								
			SANDY lean CLAY (CL); hard; brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; high toughness.															
315.00	30				SS-07	30.0 31.5	9-13-18	31	18	10			14.2	44	20			Switched to 7"ø drill bit PP: >5.0, 3.5, 2.75 tsf
310.00	35		SANDY SILT (ML); medium dense; dark yellowish brown; moist; some SAND; fine to medium SAND; micaceous.		MC-08	35.0 36.5	15-12-19	31	18	16	56							
305.00	40		Poorly graded SAND (SP); medium dense; grayish brown; moist; trace fines; fine SAND.															

(continued)

REPORT TITLE: BORING RECORD				HOLE ID: S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 2 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV/NG	BEGIN DATE: Oct-25-13	COMPLETION DATE: Oct-28-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2378461.834 / E6175843.037 (NAD83 CA Z5)	HOLE ID: S0085R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 345 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		SANDY CLAY (CL); stiff; brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; rapid dilatancy; low toughness.		SS-09	40.0 41.5	10-7-8	15	18	10.5								PP: 4.5 tsf
300.00	45		SILTY SAND (SM); dense; yellowish brown; moist; little fines; medium SAND; subrounded to rounded; moderate cementation.		MC-10	45.0 46.5	24-26-26	52	18	15								Cementation does not react to HCL
295.00	50		- very dense; yellowish brown grades to light gray; little to few fines.		SS-11	50.0 51.5	21-29-35	64	18	10.5								Light gray cementation does not react HCL.
290.00	55		SANDY SILTY CLAY (CL-ML); hard; yellowish brown; moist; some SAND; fine SAND; medium plasticity; medium dry strength; no dilatancy; high toughness.		MC-12	55.0 56.5	13-18-21	39	18	15								PP: 4.5 tsf TV: .58 tsf
285.00	60		CLAYEY SAND (SC); medium dense; dark yellowish brown with occasional dark gray mottling (1/8") diameter; moist; some fines; fine SAND; micaceous.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 3 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Oct-25-13 / Oct-28-13	N2378461.834 / E6175843.037 (NAD83 CA Z5)		S0085R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			345 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				SS-13	60.0 61.5	11-13-15	28	18	9								High dry strength
			SANDY lean CLAY (CL); hard; brown mottled with grayish brown and dark brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; medium toughness; micaceous.															
280.00	65				MC-14	65.0 66.5	14-28-30	58	18	17		113.2	16.7			UU 3508		PP: 5.0 tsf TV: .57 tsf
			SILTY SAND (SM); very dense; grayish brown variegated with brown and reddish brown layers; some fines; fine SAND; 3" thick layers interbedded with SANDY SILT (SM); hard; brown variegated with reddish brown; some SAND; fine SAND; medium plasticity; medium toughness; medium dry strength.															
275.00	70				SS-15	70.0 68.5	15-23-32	55	18	8								Fines content increasing downward
			CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND.															
270.00	75				MC-16	75.0 76.5	18-30-31	61	18	12	40.6	121.1	12.4	28	9			
			SANDY SILT (ML); hard; brown; moist.															
265.00	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	4 of 6	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Oct-25-13 / Oct-28-13	N2378461.834 / E6175843.037 (NAD83 CA Z5)		S0085R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			345 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				SS-17	80.0 81.5	17-23-25	48	18	14								PP: 4.0. tsf
			CLAYEY SAND (SC); very dense; brown; moist; some fines; fine to medium SAND; subangular to subrounded; strong cementation.															
260.00	85				MC-18	85.0 86.4	24-32-50/5"	82/11"	17	14		122.6	12.1					TXCD
			SANDY CLAY (CL); hard; dark yellowish brown; moist; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; medium toughness; with pockets of CLAYEY SAND (SC).															
255.00	90				SS-19	90.0 91.5	12-15-17	32	18	11								PP: 4.5 tsf Approximate 2" of SAND pockets
250.00	95		- some SAND.		MC-20	95.0 95.8	31-50	50/4"	10	10								PP: 4.9 tsf TV: .35 tsf
			CLAYEY SAND (SC); very dense; brown; moist; some fines; fine SAND; interbedded with SANDY CLAY (CL) hard; brown; mosit; some SAND; fine; medium plasticity; high dry strength; medium toughness; no dilatancy.															
245.00	100																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 6

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Oct-25-13 / Oct-28-13	N2378461.834 / E6175843.037 (NAD83 CA Z5)		S0085R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			345 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	101.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
100					SS-21	100.0 101.5	16-34-29	63	18	8									PP: 5.0 tsf
240.00	105																		
235.00	110																		
230.00	115																		
225.00	120																		

Borehole terminated at a depth of 101.5' on 10/28/2013.

Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.

See Borehole Log Legend for soil classification chart and key to test data and sampler type.

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0085R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	6 of 6	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV	BEGIN DATE: Nov-05-13	COMPLETION DATE: Nov-05-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2378143.774 / E6176060.068 (NAD83 CA Z5)	HOLE ID: S0086R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 344.67 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); very loose; brown; dry; some fines; fine SAND; micaceous.		B-01	0.0			60	60									COMP, RV Hand augered to 5.0' below ground surface
339.67	5					5.0													
					SS-02	5.0	2-1-2	3	18	9.5									
						6.5					40.9		8.6						
334.67	10				MC-03	10.0	2-2-4	6	18	14									Trace GRAVEL in slough
			SANDY SILTY CLAY (CL-ML/SM); medium stiff; brown; moist; some SAND; fine SAND; low plasticity.			11.5					45.7	109.7	18.4	28	7	UU 1097			
329.67	15		SANDY SILTY CLAY (CL-ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; low toughness; micaceous.		SS-04	15.0	6-12-7	19	18	0									Recovery not noted
						16.5							18.7	26	7				
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; little fines; fine SAND; micaceous.																
324.67	20																		

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-05-13	Nov-05-13	N2378143.774 / E6176060.068 (NAD83 CA Z5)	S0086R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				344.67 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	5-10-16	26	18	16	19.6	118.7	9.8					
			SANDY SILT (ML); very stiff; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; low toughness; weak cementation; micaceous.															
319.67	25				SS-06	25.0 26.5	8-9-15	24	18	9	54.3		18.4	27	5			
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; little fines; fine SAND; cemented nodules; micaceous.															
314.67	30				MC-07	30.0 31.5	11-14-16	30	18	15.5	16		14.6					
309.67	35		- dense; grayish brown; fine to medium SAND; no cementation; grades finer with depth.		SS-08	35.0 36.5	13-14-22	36	18	13								
304.67	40																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	2 of 6

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-05-13	Nov-05-13	N2378143.774 / E6176060.068 (NAD83 CA Z5)	S0086R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				344.67 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		- very dense; brown; little fines; fine to medium SAND; trace coarse SAND; some fines; moderate cementation; micaceous.		MC-09	40.0 41.5	15-39-49	88	18	15.5	15.4		8.7					
			SILTY SAND (SM/ML); medium dense; grayish brown; moist; some fines; fine SAND; moderate cementation; interbedded with layers of SANDY SILT (ML); brown; low plasticity; micaceous; some SAND; fine SAND.															
299.67	45				SS-10	45.0 46.5	6-9-11	20	18	7.5	46							
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND; micaceous.															
294.67	50				MC-11	50.0 51.5	13-21-46	67	18	13								
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; fine SAND; micaceous.															
			SANDY SILT (ML/SM); dense; dark yellowish brown; moist; some SAND; fine SAND; micaceous.															
289.67	55				SS-12	55.0 56.5	14-25-20	45	18	7.5	52		15.8					
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; fine SAND; micaceous.															
284.67	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 6

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: SV	BEGIN DATE: Nov-05-13	COMPLETION DATE: Nov-05-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2378143.774 / E6176060.068 (NAD83 CA Z5)	HOLE ID: S0086R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/E. Santellan			IN-SITU TESTING	SURFACE ELEVATION: 344.67 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-101')			DRILL RIG: M-10 (D44)	BOREHOLE DIAMETER: 4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 85%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	23-42-36	78	18	12	65.6	127.8	10.6 10.6	30	8			
			SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; very high dry strength; low toughness.															
279.67	65		- low to medium plasticity; micaceous.		SS-14	65.0 66.5	8-16-20	36	18	14								PP: 2.5, 3.0, 3.25 tsf
			SILTY SAND (SM); very dense; grayish brown; moist; little fines; medium SAND; micaceous.															
274.67	70				MC-15	70.0 71.3	32-47-50/4"	97/10"	16	13	15.7		9.2					
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; medium toughness; micaceous.															
269.67	75				SS-16	75.0 76.5	10-20-26	46	18	0				32	10			Recovery not noted
			CLAYEY SAND (SC); very dense; dark yellowish brown variegated with black; moist; some fines; fine SAND; micaceous; trace medium SAND.															
264.67	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 4 of 6

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-05-13	Nov-05-13	N2378143.774 / E6176060.068 (NAD83 CA Z5)	S0086R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				344.67 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-17	80.0 81.4	20-35-50/5"	85/11"	17	13								
259.67	85		SILTY SAND (SM); very dense; grayish brown; moist; some fines; medium SAND; subrounded; micaceous.		SS-18	85.0 86.5	23-30-20	50	18	6								
254.67	90		Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; little fines; fine to medium SAND; subrounded; micaceous.		MC-19	90.0 91.0	45-50/5.5"	50/5.5"	11.5	11.5								
249.67	95		SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND; medium plasticity; medium toughness; micaceous.		SS-20	95.0 95.5	10-24-38	62	18	10.5				32	8			SAND get coarser with depth
244.67	100		Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; little fines; fine SAND; micaceous.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 6

CALIFORNIA High-Speed Rail Authority

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CALIFORNIA HIGH-SPEED TRAIN

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV	Nov-05-13	Nov-05-13	N2378143.774 / E6176060.068 (NAD83 CA Z5)	S0086R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/E. Santellan				344.67 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-101')			M-10 (D44)	4-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	85%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	101 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
100				1	MC-21	100.0 100.8	22-50/4"	50/4"	10	9								
239.67	105		Borehole terminated at a depth of 101.0' on 11/5/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
234.67	110																	
229.67	115																	
224.67	120																	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0086R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	6 of 6

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG	BEGIN DATE: Nov-04-13	COMPLETION DATE: Nov-04-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2376064.32 / E6178613.222 (NAD83 CA Z5)	HOLE ID: S0087R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 346.56 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-80.9')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 80.9 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; moist; some fines; medium SAND; subangular to subrounded; micaceous.		B-01	0.0			60	60									COMP, RV Hand augered to 5.0' below ground surface
341.56	5		- dark brown; fine SAND; subangular.		SS-02	5.0	3-3-3	6	18	13.5									
			Poorly graded SAND (SP); loose; grayish brown; moist; trace fines; medium SAND; fine to coarse SAND; subangular to subrounded; micaceous.			6.5													
			SILTY SAND (SM); loose; brown; moist; some fines; fine to medium SAND.																
336.56	10				MC-03	10.0	4-4-5	9	18	14		118.2	9.8						DS
						11.5													
			CLAYEY SAND (SC); medium dense; brown mottled with dark gray and reddish brown; moist; some fines.																
331.56	15				SS-04	15.0	6-9-12	21	18	8									
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some SAND; medium to fine SAND; medium plasticity; high dry strength; medium toughness.			16.5													Downward and thrust reached 400psi; Shelby tube sampler
					U-05	17.0			24	12									
						19.0													
326.56	20																		

(continued)

REPORT TITLE: BORING RECORD				HOLE ID: S0087R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Nov-04-13	Nov-04-13	N2376064.32 / E6178613.222 (NAD83 CA Z5)	S0087R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin				346.56 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-80.9')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	80.9 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine SAND.		MC-06	20.0 21.5	7-10-12	22	18	16	39.8	123.3	11.6 11.6					
			SANDY SILTY CLAY (CL-ML); stiff; dark yellowish brown mottled with reddish brown; moist; some fines; fine SAND.															
321.56	25				SS-07	25.0 26.5	7-7-6	13	18	8				24	6			
			SANDY SILT (ML); medium dense; grayish brown; moist; little SAND; fine SAND; micaceous.															
316.56	30				MC-08	30.0 31.5	6-7-11	18	18	16	79	91.0	30.3					DS
			SILT with SAND (ML); very stiff; yellowish brown; moist; little SAND; fine SAND; micaceous.															
311.56	35				SS-09	35.0 36.5	8-9-10	19	18	7.5	72.8		18.8					
			SILTY SAND (SM); dense; moist; some fines; fine SAND.															
306.56	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0087R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	2 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG / Nov-04-13 / Nov-04-13	N2376064.32 / E6178613.222 (NAD83 CA Z5)		S0087R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.56 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-80.9')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	80.9 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-10	40.0 41.5	16-27-31	58	18	12.5		100.1	7.5					DS
301.56	45		- medium dense; dark yellowish brown; interbedded with SANDY SILT (ML); 1/4" layers 3" apart; some SAND; no plasticity; low dry strength; low toughness; rapid dilatancy.		SS-11	45.0 46.5	6-7-13	20	18	9.5								
296.56	50		- few to little fines; medium SAND; subangular to rounded; micaceous; not interbedded.		MC-12	50.0 51.5	19-19-21	40	18	13.5								
			SANDY SILT (ML); very stiff; brown variegated with dark yellowish brown; moist; some SAND; fine SAND; no plasticity; low dry strength; rapid dilatancy; low toughness.															
291.56	55		CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND; micaceous.		SS-13	55.0 56.5	18-23-25	48	18	9								
286.56	60																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0087R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	3 of 5	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Nov-04-13	Nov-04-13	N2376064.32 / E6178613.222 (NAD83 CA Z5)	S0087R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin				346.56 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-80.9')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	80.9 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		- brown mottled with reddish brown; fine to medium SAND.		MC-14	60.0 61.5	17-24-29	53	18	16.5								
			SANDY lean CLAY (CL); hard; brown mottled with dark gray; moist; little SAND; fine SAND; medium plasticity; high dry strength; no dilatancy; medium toughness.															
281.56	65				SS-15	65.0 66.5	8-11-12	23	18	9								PP: >5.0 tsf
276.56	70		- hard; brown; some SAND; fine SAND.		MC-16	70.0 71.5	17-25-42	67	18	14								PP: >5.0 tsf TV: 0.9 tsf
			CLAYEY SAND (SC); dense; brown; moist; some fines; fine SAND.															
			SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND.															
271.56	75				SS-17	75.0 76.5	16-20-25	45	18	7	56.6		14.4					
			SILTY SAND with GRAVEL (SM); very dense; brown; moist; some to little fines; fine to medium SAND; occasional dark gray GRAVEL; subrounded; volcanic.															
266.56	80																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0087R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	4 of 5

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG	Nov-04-13	Nov-04-13	N2376064.32 / E6178613.222 (NAD83 CA Z5)	S0087R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin				346.56 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-80.9')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	80.9 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-18	80.0 80.9	25-50/4.5"	50/4.5"	10.5	10								
261.56	85		Borehole terminated at 80.9' below ground surface. Backfill grouted the entire hole using 6 sack cement mix to 47 gallons of H2O mixed in a 55 gallon drum. A total of 9 sacks of grout was tremied into the hole and was observed flowing out of the top. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
256.56	90																	
251.56	95																	
246.56	100																	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0087R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 5

PROJECT NAME **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER **131577-00**
LOGGED BY NG/SV	BEGIN DATE Oct-29-13	COMPLETION DATE Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum) N2365253.916 / E6188717.917 (NAD83 CA Z5)	HOLE ID S0088AR
DRILLING CONTRACTOR/DRILLER Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION 346.14 ft (NAVD88)
DRILLING METHOD AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG D-1 (B53)	BOREHOLE DIAMETER 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID) MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi 78%
BOREHOLE BACKFILL AND COMPLETION Piezometer			GROUNDWATER READINGS DURING DRILLING Not Recorded	AFTER DRILLING (DATE) Not Recorded	TOTAL DEPTH OF BORING 151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; moist; some fines; fine SAND; [FILL].		B-01	0.0			72	72									COMP, RV Hand augered to 6.0' below ground surface. S0312CPT located approx. 3.0' from borehole
341.14	5					6.0													Dark brown orange top soil in the sloughed material.
			- very loose; yellowish brown; trace coase SAND.		SS-02	6.0 7.5	1-2-2	4	18	8									
			Poorly graded SAND (SP); medium dense; grayish brown; moist; trace fines; medium SAND; fine to coarse; subrounded to rounded; [NATIVE].																
336.14	10				MC-03	10.0 11.5	11-13-19	32	18	12.5		113.6	4.6						DS
			Lean CLAY with SAND (CL); stiff; brown; moist; little SAND; fine; medium plasticity; low dry strength; rapid dilatancy; low toughness.																
331.14	15				SS-04	15.0 16.5	6-7-7	14	18	6.5				33	19				PP: 5.0 tsf
			SILTY SAND (SM); medium dense; brown; moist; some fines; fine SAND.																
326.14	20																		

(continued)

REPORT TITLE BORING RECORD				HOLE ID S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME California High-Speed Train				
BRIDGE NUMBER	PREPARED BY J. Borghesi		DATE 5-14-14	SHEET 1 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME: **California High-Speed Train Fresno to Bakersfield**			PROJECT NUMBER: **131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2365253.916 / E6188717.917 (NAD83 CA Z5)	HOLE ID: S0088AR
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 346.14 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	10-10-12	22	18	15		121.1	6.7					DS
321.14	25		- brown to light brown.		SS-06	25.0 26.5	7-9-12	21	18	11	31							
			Poorly graded SAND (SP); dense; grayish brown; moist; trace fines; fine SAND; subangular to subrounded.															
316.14	30				MC-07	30.0 31.5	19-18-29	47	18	14		110.6	10.9					DS
			SILT with SAND (ML); hard; brown; moist; little SAND; fine SAND; no plasticity; low dry strength; rapid dilatancy; low toughness.															
311.14	35				SS-08	35.0 36.5	8-17-24	41	18	10	76							
			SILTY SAND (SM); dense; brown; moist; some fines; fine to medium SAND; moderate cementation.															
306.14	40																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 2 of 8

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Oct-29-13 / Oct-30-13	N2365253.916 / E6188717.917 (NAD83 CA Z5)		S0088AR
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.14 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0 41.5	16-22-30	52	18	15.5		120.4	9.4					TXCD
301.14	45				SS-10	45.0 46.5	13-12-18	30	18	9.5								
			Blocky SANDY SILTY CLAY (CL-ML); hard; variegated brown and reddish brown; moist; some SAND; fine SAND; low plasticity; low dry strength; rapid dilatancy; low toughness.															
296.14	50				MC-11	50.0 51.5	13-31-48	79	18	17		123.4	10.9	20	6	UU 2218		PP: 5.0 tsf TV: .67 tsf
			Lean CLAY with SAND (CL); hard; brown variegated with dark gray; moist; medium plasticity; occasional cemented nodules (1/8" diameter).															
291.14	55				SS-12	55.0 56.5	9-22-32	54	18	15								
			SILTY SAND (SM); dense; brown variegated with reddish brown; moist; some fines; fine SAND; pockets and partings of SANDY SILT (ML).															
286.14	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	3 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Oct-29-13 / Oct-30-13	N2365253.916 / E6188717.917 (NAD83 CA Z5)		S0088AR
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.14 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	13-19-45	64	18	16								SAND content increasing downward
			Lean CLAY (CL); hard; brown variegated with dark gray; moist; some SAND; fine SAND; low plasticity; high dry strength; medium toughness.															
281.14	65				SS-14	65.0 66.5	21-23-28	51	18	11.5								PP: 3.3 tsf
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND.															
			SILTY CLAY with SAND (CL); hard; dark yellowish brown; moist; little SAND; fine SAND; medium plasticity.															
276.14	70				MC-15	70.0 71.5	16-21-35	56	18	16.5		111.8	16.7	30	11	UU 2513		
			SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND; low plasticity; micaceous.															
271.14	75				SS-16	75.0 76.5	14-21-27	48	18	9.5	68							PP: 5.0 tsf
266.14	80																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	4 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Oct-29-13 / Oct-30-13	N2365253.916 / E6188717.917 (NAD83 CA Z5)		S0088AR
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.14 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80		SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND.		MC-17	80.0 81.5	44-47-44	91	18	13.5								
			SANDY SILT (ML); hard; yellowish brown to brown; moist; some SAND; fine SAND; no plasticity; medium dry strength; high dilatancy; low toughness.															PP: 5.0 tsf TV: 1.44 tsf
			SILTY SAND (SM); very dense; brown; moist; some fines; fine to medium SAND.															SILT mostly in the bottom of the sample and in the shoe
261.14	85				SS-18	85.0 86.5	30-48-41	89	18	8								
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; medium SAND; fine to coarse; subangular to subrounded; micaceous.															
256.14	90				MC-19	90.0 91.5	28-45-34	79	18	13								
			SILTY SAND (SM); very dense; brown; moist; little fines; fine SAND.															PP: 5.0 tsf TV: 1.17 tsf
			SANDY CLAY (CL); hard; dark yellowish brown; moist; some SAND; fine to medium SAND; high plasticity; high dry strength; no dilatancy; medium toughness.															
			SILT (ML); hard; grayish brown mottled with reddish brown; moist; trace SAND; no plasticity; medium dry strength; slow dilatancy; low toughness.															
251.14	95				SS-20	95.0 96.5	10-17-21	38	18	13	95							
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; fine SAND.															
246.14	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 8

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Oct-29-13	COMPLETION DATE: Oct-30-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2365253.916 / E6188717.917 (NAD83 CA Z5)	HOLE ID: S0088AR
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING	SURFACE ELEVATION: 346.14 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-151')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Piezometer			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 100.5	50	50/6"	6	6									56 blows in the top 6". Drove the sampler 9" to make sure a 6" sample was recovered
			SILT with SAND (ML); hard; dark yellowish brown variegated with reddish brown; moist; low plasticity; very high dry strength; medium toughness; micaceous.																
241.14	105				SS-22	105.0 106.5	12-21-20	41	18	10	74								PP: >5.0, >5.0 tsf
			SANDY lean CLAY (CL); hard; brown mottled with black; moist; little SAND; fine SAND; micaceous.																
236.14	110				MC-23	110.0 111.4	23-42-50/5"	92/11"	17	16		115.4	16.0			UU 7586			
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; fine SAND; micaceous.																
231.14	115				SS-24	115.0 115.8	34-50	50/4"	10	10									Recovery not noted
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND; micaceous.																
226.14	120																		

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 6 of 8	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Oct-29-13 / Oct-30-13	N2365253.916 / E6188717.917 (NAD83 CA Z5)		S0088AR
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.14 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				MC-25	120.0 121.4	24-36-50	86/ 11"	17	14								
			SANDY lean CLAY (CL); hard; brown; some SAND; fine SAND; low plasticity; weak cementation; micaceous.															
221.14	125				SS-26	125.0 126.5	12-18-56	74	18	18	58			26	11			
			CLAYEY SAND (SC); very dense; brown; moist; some fines; medium SAND; micaceous.															
216.14	130				MC-27	130.0 130.9	36-50/4.5"	50/ 4.5"	10.5	10.5								
			SILTY SAND (SM); dense; brown; moist; some fines; fine SAND; low plasticity; micaceous; interbedded with layers of SANDY SILT (ML); brown; low plasticity.															
211.14	135				SS-28	135.0 136.5	11-17-27	44	18	18								Recovery not noted
			SANDY CLAY (CL); hard; brown; moist.															
206.14	140																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	7 of 8

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Oct-29-13 / Oct-30-13	N2365253.916 / E6188717.917 (NAD83 CA Z5)		S0088AR
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin			346.14 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-151')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Piezometer		Not Recorded / Not Recorded	151 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	140		- some SAND; fine SAND; weak cementation; micaceous.		MC-29	140.0 141.3	19-52-50/3"	102/9"	15	13								
201.14	145		SILTY SAND (SM); very dense; grayish brown; moist; little fines; fine SAND; micaceous.		SS-30	145.0 145.8	41-50/4"	50/4"	10	6.5								
196.14	150		Poorly graded SAND with SILT (SP-SM); very dense; dark yellowish brown; moist; few fines; medium SAND; micaceous.		MC-31	150.0 150.9	46-50/5"	50/5"	11	10								
			Borehole terminated at a depth of 151.0' on 10/30/2013.															
			Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.															
191.14	155		See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
186.14	160																	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088AR
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	8 of 8	

Log|PIEZOMETER LOG 2/15/2012 11:00:17 AM

STANDPIPE PIEZOMETER INSTALLATION LOG

(continued)

PIEZOMETER NO.:

BORING NO.: **S0088AR**

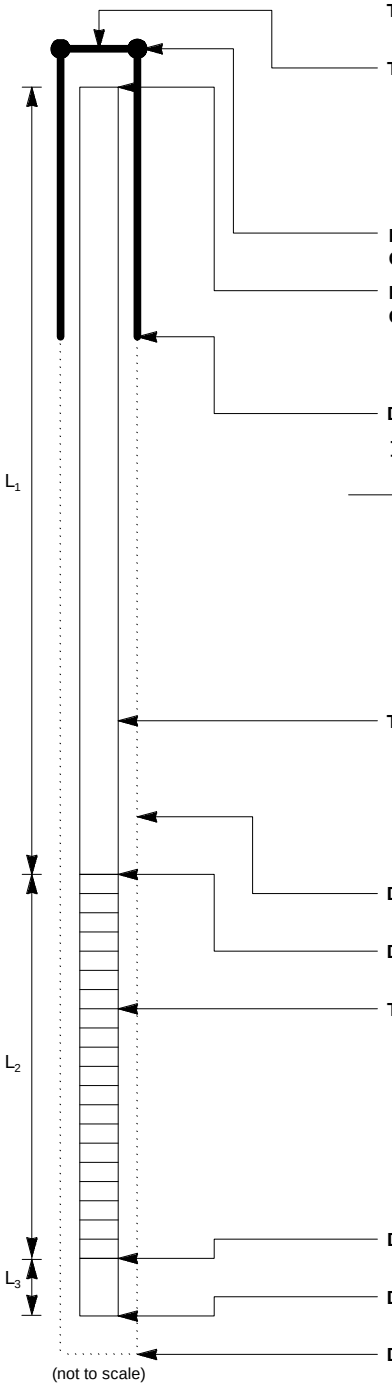
Project:	California High Speed Rail - Fresno to Bakersfield	**Project No.:**	131577-00
Location:	Santa Fe Hwy and Riverside Avenue	**Project Mgr:**	M. Walker
Client:	California High Speed Rail Authority	**Field Eng. Staff:**	NG/SV
Drilling Co.:	Gregg Drilling	**Date Installed:**	10/30/2013
Driller:	E. Santellan		

Ground El.: 346.14 ft.
Vertical Datum: NAVD 88

Boring Location:
N: 2365253.916 **E:** 6188717.917
Horizontal Datum: NAD 83 CA Z5

Well Cover:
☐ Guard Pipe ☒ Roadway Box
☐ Other:

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
See corresponding borehole log for stratigraphy	Neat Cement Grout
	5-ft Bentonite Plug
	#3 Filter Sand



Total Number of Piezometers in Borehole: 1

Type of Protective Cover/Lock: Traffic-rated 2-hex bolt cover with padlock

Length: 1.0 ft.

Inside Diameter: 10.0 in.

Height/Depth of Cover Above/Below Ground Surface: 0.0 ft.

Height/Depth of Riser Pipe Above/Below Ground Surface: 0.33 ft.

Depth of Bottom of Casing: 1 ft.

Type of Seal	Top of Seal (ft)	Thickness (ft)

Type of Riser Pipe: 2" PVC Sch 40 Riser

Inside Diameter of Riser Pipe: 2.0 in.

Type of Backfill Around Riser: Neat cement grout backfill above a 5.0 ft bentonite plug

Diameter of Borehole: 4.875 in.

Depth of Top of Well Screen: 120.0 ft.

Type of Screen: 2" PVC Sch 40 Screen

Screen Gauge or Size of Openings: 0.02 in.

Diameter of Screen: 2.0 in.

Type of Backfill Around Screen: #3 sand

Depth of Bottom of Well Screen: 150.0 ft.

Depth of Bottom of Silt Trap: 150.5 ft.

Depth of Bottom of Borehole: 151.0 ft.

151.0 ft. (Bottom of Exploration) — 151.0 ft.

*Note: Numbers refer to depth from ground surface in feet
(+) = depth below ground surface
(-) = depth above ground surface

120.0 ft.	+	30.0 ft.	+	0.0 ft.	=	150 ft.
Length of Riser (L_1)		Length of Screen (L_2)		Length of Silt Trap (L_3)		Total Length

Comments: Sand type: CEMEX #3 sand, clean, graded, kiln dried, Monterey (50 lb bags)
Bentonite: EnviroPlug, medium, Wyo-Ben, Inc. (50 lb bags)
Cement: Basalite Type II-V cement, Portland cement (47 lb bags)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (ML); loose; brown; dry; some SAND; fine SAND.		B-01	0.0			60	60	37.3		9.9						CBR, COMP, CORR, RV Hand augered to 5.0' below ground surface (3" diameter)
						5.0													
339.64	5		SILTY SAND (SM/ML); loose; brown; moist; some fines; fine SAND.		SS-02	5.0	4-4-5	9	18	11									PP: 5.0 tsf
						6.5					49.1								
			SANDY fat CLAY (CH); very stiff; brown mottled with grayish brown and reddish brown; moist; some SAND; fine SAND; no plasticity; high dry strength; slow dilatancy; medium toughness.																
334.64	10				MC-03	10.0	9-20-22	42	18	17.5		104.7	19.9	53	34				PP: 5.0 tsf TV: .80 tsf
						11.5						114.9	13.3			UU 3329			
			SANDY SILT (ML); very stiff; brown variegated reddish brown; some SAND; fine SAND; no plasticity; low dry strength; low toughness.																1/4" reddish brown streaks
329.64	15				SS-04	15.0	3-4-4	8	18	9.5									PP: 3.2 tsf
						16.5					64								
			SANDY SILTY CLAY (CL-ML); medium; brown; moist; some SAND; low plasticity; low dry strength; low toughness.		U-05	17.0			24	14	67.1		32.8						
						19.0						101.8	21.8	28	6	UU 2939			Shelby tube sampler. 200psi downward thrust
324.64	20		SANDY lean CLAY (CL); very stiff; dark yellowish																

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	1 of 9

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		brown; moist; some SAND; fine SAND; low plasticity; high dry strength; no dilatancy.		MC-05	20.0 21.5	10-10-12	22	18	14.5		108.4	16.8					PP: 5.0 tsf
			SILTY SAND (SM/ML); medium dense; brown; moist; some fines; fine SAND; micaceous.															
319.64	25				SS-06	25.0 26.5	5-8-12	20	18	12	46							Increasing fines content downwards
			SILTY SAND (SM); dense; brown; moist; some fines.															
314.64	30				MC-07	30.0 31.5	12-32-32	64	18	16		121.8	10.2					DS
309.64	35		- very dense; grayish brown; little fines; fine to medium SAND; subrounded.		SS-08	35.0 36.5	20-26-29	55	18	14								
304.64	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	2 of 9

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		- dense; brown mottled with dark yellowish brown; some to little fines; medium SAND; subrounded.		MC-09	40.0 41.5	15-24-36	60	18	16								
299.64	45		- very dense; grayish brown; little fines; medium SAND; subrounded to rounded; micaceous.		SS-10	45.0 46.5	20-25-32	57	18	13								
294.64	50		- dense; grayish brown mottled with brown and occasionally variegated with reddish brown; some fines; fine SAND; interbedded with SANDY SILT (ML); hard; brown and reddish brown; moist; some SAND; fine; nonplastic; low toughness; SILT partings and layers vary between 1" thick to 3" thick.		MC-11	50.0 51.5	14-29-41	70	18	15		108.1	14.0					TXCD
			SANDY SILT (ML); hard; brown; moist; some SAND; fine SAND; low plasticity; low dry strength; low toughness.															
289.64	55				SS-12	55.0 56.5	17-22-27	49	18	11								TV: .43 tsf
			SANDY SILT (ML/SM); hard; dark yellowish brown; moist; some SAND; low plasticity; high dry strength; low toughness; interbedded with SILTY SAND.															
284.64	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	3 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	22-26-25	51	18	15.5								PP: 5.0 tsf TV: .60 tsf
					U-14	62.0 63.5			18	15								Pushed shelby tube sampler 1.5'
279.64	65		SANDY SILT (ML); hard; brown variegated with reddish brown; moist; some SAND; fine SAND; low plasticity; medium dry strength; low toughness.		SS-15	65.0 66.5	8-11-12	23	18	10.5								PP: 5.0 tsf
274.64	70		- brown; no plasticity; low dry strength; slow dilatancy; low toughness.		MC-16	70.0 71.5	17-21-36	57	18	16		105.2	19.3					PP: 3.9 tsf TV: .50 tsf DS
269.64	75		SILTY SAND (SM); very dense; grayish brown; moist; little fines; fine SAND; medium to fine SAND.		SS-17	75.0 76.0	30-50	50/6"	12	8								
264.64	80		- dark yellowish brown variegated with dark reddish brown; moist; some fines; fine SAND; micaceous.															

(continued)

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	4 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80				MC-18	80.0 81.5	24-37-43	80	18	15	33	118.7	12.5					
259.64	85		- dense; dark yellowish brown; moist; some fines; fine to medium SAND; subrounded to rounded.		SS-19	85.0 86.5	26-24-25	49	18	6.5								
254.64	90		SANDY SILT (ML); hard; dark yellowish brown; moist; some SAND; fine SAND; no plasticity; low dry strength; low toughness.		MC-20	90.0 91.5	17-26-35	61	18	14.5								PP: 5.0 tsf TV: .80 tsf
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; medium plasticity.		U-21	92.0 93.1			13	12		108.9	16.1	33	15			Pushed shelby tube sampler; 850psi 13"/24" TXCD
249.64	95		SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous; interbedded with layers of SANDY SILT (ML); hard; dark yellowish brown; low plasticity.		SS-22	95.0 96.5	24-30-31	61	18	6								
244.64	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 9

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-23	100.0 100.8	44-50	50/4"	10	10								
			SANDY SILT (ML); hard; dark yellowish brown; moist; some SAND; fine SAND; low to no plasticity; very high dry strength; low toughness; micaceous.															
239.64	105				SS-24	105.0 106.5	17-27-33	60	18	8								
			SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some fines; some SAND; low to medium plasticity; very high dry strength; medium toughness; micaceous.															
234.64	110				MC-25	110.0 111.4	22-42-50/5"	92/11"	17	17								
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; fine to medium SAND.															
229.64	115				SS-26	115.0 115.5	50/6"	50/6"	6	5								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.															
224.64	120																	

(continued)

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	6 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Nov-05-13 / Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)		S0088R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. Heavilin	PS Logging		344.64 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				MC-27	120.0 121.0	31-50	50/6"	12	11								
219.64	125		SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some fines; some SAND; fine SAND; medium plasticity; very high dry strength; low toughness; micaceous.		SS-28	125.0 126.5	12-34-42	76	18	15.5								PP: >5.0 , 4.25, 4.25 tsf
214.64	130		SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.		MC-29	130.0 131.5	27-41-49	90	18	18								
209.64	135		Rat hole drilled to 165.0' for PS Logging.															
204.64	140																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	7 of 9	

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG/SV	Nov-05-13	Nov-07-01	N2370926.503 / E6183716.259 (NAD83 CA Z5)	S0088R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. Heavilin			PS Logging	344.64 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), MUD ROTARY(5'-165')			D-1 (B53)	5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	140																	
199.64	145																	
194.64	150																	
189.64	155																	
184.64	160																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	8 of 9

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Nov-05-13	COMPLETION DATE: Nov-07-01	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2370926.503 / E6183716.259 (NAD83 CA Z5)	HOLE ID: S0088R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. Heavilin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 344.64 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), MUD ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	160																	
179.64	165		Borehole terminated at a depth of 165.0' on 11/7/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
174.64	170																	
169.64	175																	
164.64	180																	

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0088R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 9 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Sep-18-13 / Sep-19-13	N2359904.421 / E6193687.628 (NAD83 CA Z5)		S0089R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin			341.76 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-6'), MUD ROTARY(6'-81.5')	D-1 (B53)		3-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; moist; little fines; trace GRAVEL; medium SAND; micaceous; [FILL].		B-01	0.0			72	72	21.7		4.9					CBR, COMP, CORR, RV Hand augered to 6.0' below ground surface (3" diameter)
336.76	5		SILTY SAND (SM); loose; brown; moist; little fines; trace GRAVEL; medium SAND; micaceous; strongly cemented occasional layer of (1") of calcite cemented SILTY SAND; [NATIVE].			6.0												
			- reddish brown; little fines; medium SAND; micaceous.		MC-02	6.0 7.5	4-5-9	14	18	16								5YR/4/4
331.76	10		SANDY SILT (ML); stiff; brown; moist; low stiffness; occasional dark gray pocket (1/2" x 1/2"); low plasticity; low dry strength; slow dilatancy.		SS-03	10.0 11.5	2-3-6	9	18	11	74.4		16.5					PP: >5.0 tsf TV: 0.45 tsf
326.76	15		- very stiff; fine SAND; blocky with moderately cemented nodules (1/4"); medium dry strength; low to high toughness.		MC-04	15.0 16.5	16-16-18	34	18	16		111.8	14.5			UU 5308		Hammer calibration carried out on samples from 15' to 40' PP: >5.0 tsf TV: 1.13 tsf
321.76	20																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0089R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	1 of 5	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-18-13	COMPLETION DATE: Sep-19-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2359904.421 / E6193687.628 (NAD83 CA Z5)	HOLE ID: S0089R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING	SURFACE ELEVATION: 341.76 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), MUD ROTARY(6'-81.5')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 3-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20		- hard; some to little fine SAND; low dry strength; low toughness.		SS-05	20.0 21.5	13-17-21	38	18	12								PP: 4.25 tsf TV: 0.18 tsf
			SILTY SAND (SM); medium dense; brown; moist; some fines; fine to medium SAND.															
316.76	25				MC-06	25.0 26.5	11-17-20	37	18	16.5		73.6 111.8	21.5 13.4			UU 6260		PP: 3.5 tsf TV: 0.39 tsf
			SANDY SILT (ML); very stiff; brown; moist; some SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
311.76	30		Poorly graded SAND with SILT (SP-SM); dense; grayish brown variegated with dark yellowish brown; moist; few fines; coarse grades to fine SAND; occasional seam and parting dark yellowish brown; weak cementation.		SS-07	30.0 31.5	16-21-28	49	18	13.5	11.7		3.3					
			SILTY SAND (SM); medium dense; dark yellowish brown; moist; little fines; medium grained SAND; subrounded; increasing fines with depth.															
306.76	35				MC-08	35.0 36.5	25-22-21	43	18	15.5								
301.76	40																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0089R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 5	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG/SV	Sep-18-13	Sep-19-13	N2359904.421 / E6193687.628 (NAD83 CA Z5)	S0089R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				341.76 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-6'), MUD ROTARY(6'-81.5')			D-1 (B53)	3-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40		- very dense; brown; fine SAND; moderate cementation.		SS-09	40.0 41.5	17-22-32	54	18	11.5								
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines; fine to medium SAND; subrounded to rounded; micaceous.															
296.76	45				MC-10	45.0 46.5	23-41-50/5.5"	91/11.5"	17.5	16.5								
			SANDY SILT (ML); hard; reddish brown variegated with grayish brown; moist; some SAND; low plasticity; high dry strength; medium toughness; seam of SILTY SAND at 51.2'.															
291.76	50				SS-11	50.0 51.5	11-12-19	31	18	7.5				19	1			
			SILTY SAND (SM); fine SAND; seam stops at 51.1'.															
			SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; fine SAND; medium dense.															
286.76	55				MC-12	55.0 56.5	17-23-29	52	18	16	35.3	89.4	9.5					
281.76	60																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0089R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 5

CALIFORNIA High-Speed Rail Authority

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CALIFORNIA HIGH-SPEED TRAIN

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Sep-18-13 / Sep-19-13	N2359904.421 / E6193687.628 (NAD83 CA Z5)		S0089R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin			341.76 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-6'), MUD ROTARY(6'-81.5')	D-1 (B53)		3-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		- medium dense.		SS-13	60.0	11-13-14	27	18	10								
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some fine SAND; grading to seam of SILTY SAND at 61.0'; medium plasticity; medium dry strength; slow dilatancy; low toughness; stratified with layers and strata of CLAYEY SAND.			61.5												PP: 4.25 tsf TV: 1.0 tsf
276.76	65		SANDY SILTY CLAY (CL-ML); hard; dark yellowish brown; moist; some SAND; fine SAND; low plasticity; medium dry strength; no dilatancy; laminated with SILTY SAND partings.		MC-14	65.0	19-19-32	51	18	18								
						66.5					57.5	82.1	15.4	24	4			PP: >5.0 tsf TV: 0.35 tsf
			SANDY lean CLAY (CL); very stiff; dark yellowish brown; moist; some SAND; fine SAND; medium plasticity; high dry strength; medium toughness; laminated with SILTY SAND partings (<1mm).															
271.76	70				SS-15	70.0	8-9-14	23	18	16								
						71.5					75.5		20.6					PP: 2.0 tsf
266.76	75		- micaceous.		MC-16	75.0	15-39-50	89	18	16.5								
			SILTY SAND (SM); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.			76.5					24	86.0	10.3					
			SILT (ML); hard; brown variegated with reddish brown and grayish brown; moist; some SAND; medium plasticity; medium dry strength; no dilatancy; medium toughness; micaceous.															
261.76	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0089R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	4 of 5

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
NG/SV	Sep-18-13	Sep-19-13	N2359904.421 / E6193687.628 (NAD83 CA Z5)	S0089R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin				341.76 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-6'), MUD ROTARY(6'-81.5')			D-1 (B53)	3-7/8 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	81.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80																	
					SS-17	80.0 81.5	7-17-41	58	18	13.5	91.1		24.5					
			Borehole terminated at a depth of 81.5' on 9/19/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
256.76	85																	
251.76	90																	
246.76	95																	
241.76	100																	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0089R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	5 of 5

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-16-13	COMPLETION DATE: Sep-18-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2353853.093 / E6199901.013 (NAD83 CA Z5)	HOLE ID: S0090R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin/D. Heavilin		IN-SITU TESTING	SURFACE ELEVATION: 337.35 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), ROTARY(6'-136.5')		DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")		SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout		GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; dry; some fines.		B-01	0.0			72	72	36							COMP, RV Hand augered to 6.0' below ground surface
332.35	5					6.0												
			CLAYEY SAND (SC); loose; brown; moist; some fines; fine to medium SAND; interbedded with SANDY CLAY and SANDY SILT; dark yellowish brown; low plasticity.		SS-02	6.0 7.5	3-3-4	7	18	8.5								Clay logged in last 2"
327.35	10		SILTY SAND (SM); medium dense; dark yellowish brown; moist; some fines; fine SAND; varved with SANDY CLAY and SANDY SILT; low plasticity; rapid dilatancy.		MC-03	10.0 11.5	6-10-14	24	18	16.5		103.4	8.3					DS
322.35	15		- dense.		SS-04	15.0 16.5	6-14-18	32	18	13	28							
			SILTY SAND (SM); dense; dark yellowish brown; moist; some fines; medium SAND; micaceous.															
317.35	20																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 1 of 7

CALIFORNIA High-Speed Rail Authority

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CALIFORNIA HIGH-SPEED TRAIN

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-16-13	COMPLETION DATE: Sep-18-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2353853.093 / E6199901.013 (NAD83 CA Z5)	HOLE ID: S0090R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin/D. Heavilin		IN-SITU TESTING	SURFACE ELEVATION: 337.35 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), ROTARY(6'-136.5')		DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")		SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout		GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-05	20.0 21.5	13-17-18	35	18	17.5								Reddish brown coloration that dosen't look naturally occuring.
			Poorly graded SAND with SILT (SP-SM); dense; brown; moist; few fines; medium SAND; micaceous.															
312.35	25				SS-06	25.0 26.5	11-17-20	37	18	11.5	9							Driller notes at 24' bgs possible GRAVELS, dry SAND in the shoe
			Poorly graded SAND (SP); dense; dark yellowish brown mottled with grayish brown; trace fines; micaceous.															
307.35	30				MC-07	30.0 31.5	21-25-31	56	18	16.5								
302.35	35		- brown; medium grades to fine sand; moderate cementation; micaceous.		SS-08	35.0 36.5	16-24-13	37	18	11.5								10% HCL reacts vigorously with cementation between 36.1' to 35.8'
			SANDY lean CLAY (CL); hard; brown variegated with grayish brown; moist; some SAND; fine SAND; high dry strength.															
			SILTY SAND (SM); dense; brown; moist; some fines; medium SAND grades to fine SAND; micaceous.															PP: >5.5 tsf
297.35	40																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 2 of 7	

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Sep-16-13 / Sep-18-13	N2353853.093 / E6199901.013 (NAD83 CA Z5)		S0090R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin/D. Heavilin			337.35 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-6'), ROTARY(6'-136.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0	12-16-27	43	18	17.5								
			Lean CLAY (CL); hard; brown; moist; some SAND; medium plasticity; high dry strength; slow dilatancy; medium toughness; micaceous.			41.5						100.2	21.9	29	13	UU 1603		
292.35	45				SS-10	45.0	9-11-14	25	18	10								PP: >5.5 tsf
			CLAYEY SAND (SC); medium dense; occasional black mottling; moist.			46.5												
			Poorly graded SAND (SP); very dense; variegated brown and black; moist; trace fines; fine SAND; micaceous.		MC-11	48.0	27-41-46	87	18	12								
287.35	50					49.5												
			SANDY SILT (ML); hard; brown; moist; some SAND; micaceous; occasional dark brown oxidation along fissure.															
282.35	55				SS-12	55.0	17-17-44	61	18	10.5								
						56.5					61							
			Poorly graded SAND (SP); very dense; dark yellowish brown; moist; trace fines; medium SAND; micaceous.															
277.35	60																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	3 of 7	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
NG/SV / Sep-16-13 / Sep-18-13	N2353853.093 / E6199901.013 (NAD83 CA Z5)		S0090R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin/D. Heavilin			337.35 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-6'), ROTARY(6'-136.5')	D-1 (B53)		5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60		CLAYEY SAND (SC); very dense; dark yellowish brown; moist; some fines; fine SAND; micaceous.		MC-13	60.0	19-24-31	55	18	18								
			SANDY lean CLAY (CL); hard; dark yellowish brown; moist; some SAND; medium plasticity; high dry strength; slow dilatancy; medium toughness.			61.5												PP: 4.0, 3.5, 4.0, 4.5 tsf
			CLAYEY SAND (SC); medium dense; brown; moist; some fines; fine SAND; occasional gray calcite parting. Increasing CLAY content downward.															
272.35	65				SS-14	65.0	9-13-15	28	18	9.5								
						66.5												Sample graded upward
			SILTY SAND (SM); very dense; dark yellowish brown; moist; little fines; fine SAND; layered with SANDY SILT; low plasticity; low toughness; layers and seams 1/4" to 6" thickness.															SANDY SILT layer 70.7'-71.4'
267.35	70				MC-15	70.0	14-43-50/5"	93/11"	17	17								
						71.4												PP: 4.5 tsf TV: .88 tsf
262.35	75		- brown variegated with reddish brown; micaceous.		SS-16	75.0	20-45-50/5"	95/11"	18	11								
			Poorly graded SAND (SP); very dense; light brown; moist; trace fines; medium SAND; subangular to subrounded; micaceous.			76.5												
257.35	80																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	4 of 7	

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-16-13	COMPLETION DATE: Sep-18-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2353853.093 / E6199901.013 (NAD83 CA Z5)	HOLE ID: S0090R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin/D. Heavilin		IN-SITU TESTING	SURFACE ELEVATION: 337.35 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), ROTARY(6'-136.5')		DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")		SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout		GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80		- multicolored brown, black.		MC-17	80.0 80.5	50/5.5"	50/ 5.5"	5.5	5.5								
			SILTY SAND (SM); very dense; brown; moist; some fines; fine SAND; fine to coarse; weak cementation.															
252.35	85				SS-18	85.0 86.0	28-50/5.5"	50/ 5.5"	11.5	8.5	37							
			SANDY lean CLAY (CL); hard; brown mottled with reddish brown and dark gray; moist; some SAND; medium plasticity; high dry strength; no dilatancy; high toughness.															
247.35	90				MC-19	90.0 91.5	29-31-50/5.5"	81/ 11.5"	17.5	17.5		118.2	16.8	34	20			PP: >5.0 tsf TV: 1.0 tsf
			CLAYEY SAND (SC); very dense; brown mottled with reddish brown and dark gray; moist; some fines.															
			SANDY lean CLAY (CL/SC); very dense; variegated grayish brown and reddish brown; some SAND.															
242.35	95				SS-20	95.0 96.5	14-28-36	64	18	11	54							
			Well graded SAND (SW); very dense; grayish brown; wet; trace fines; fine to coarse SAND; micaceous.															
237.35	100																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 5 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-16-13	COMPLETION DATE: Sep-18-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2353853.093 / E6199901.013 (NAD83 CA Z5)	HOLE ID: S0090R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin/D. Heavilin		IN-SITU TESTING	SURFACE ELEVATION: 337.35 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), ROTARY(6'-136.5')		DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")		SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout		GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 100.5	50	50/5"	6	5								5 blows for almost 6", sieve to test grading
			Poorly graded SAND (SP); very dense; grayish brown; wet; trace fines; medium to fine SAND; subrounded.															
232.35	105				SS-22	105.0 105.8	40-50/3.5"	50/3.5"	9.5	9.5								Fine SAND only between 105.4' to 105.6'
			SANDY SILT (ML); hard; grayish brown with gray variegated brown and reddish brown; some SAND; low plasticity; high dry strength; no dilatancy; medium toughness; small lenses of SAND (1/4" x 1" long); micaceous.															
227.35	110				MC-23	110.0 111.5	26-39-50	89	18	18	90	103.6 102.5	24.4 22.9			UU 6554		PP: >5.0 tsf TV: .83 tsf
			SANDY SILT (ML); hard; grayish brown mottled with reddish brown and variegated with dark reddish brown; some fine SAND; low plasticity; low dry strength; slow dilatancy; low toughness.															
222.35	115				SS-24	115.0 116.3	18-39-50/4"	89/10	16	9	84							
			Poorly graded SAND (SP); very dense; grayish brown grades to grayish brown with reddish brown oxidation;															
217.35	120																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi	DATE: 5-14-14	SHEET: 6 of 7	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: NG/SV	BEGIN DATE: Sep-16-13	COMPLETION DATE: Sep-18-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2353853.093 / E6199901.013 (NAD83 CA Z5)	HOLE ID: S0090R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin/D. Heavilin		IN-SITU TESTING	SURFACE ELEVATION: 337.35 ft (NAVD88)
DRILLING METHOD: AUGER(0'-6'), ROTARY(6'-136.5')		DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 5.0 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")		SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout		GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 136.5 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Remarks/ Other Tests
	120		moist; trace fines; medium SAND; subrounded to rounded.		MC-25	120.0 120.8	50-50/4"	50/4"	10	9.5		108.3	9.8						Retained only 1 sample for this interval, 120.3' to 120.8' DS
			SILTY SAND (SM); very dense; yellowish brown grades to grayish brown (last inch); wet; little fines; medium SAND.																
212.35	125				SS-26	125.0 126.3	31-47-50/3"	97/9"	15	8	16								Munsel color 10YR/5/6
			Poorly graded SAND (SP); very dense; grayish brown; trace fines; medium SAND; subangular to subrounded; micaceous; dark gray and strong cementation at 130.4'.																
207.35	130				MC-27	130.0 130.4	50/4.5"	50/4.5"	4.5	4.5									
			SANDY SILT (ML); hard; brown; wet; some SAND; low plasticity; medium dry strength; slow dilatancy; low toughness.																
202.35	135				SS-28	135.0 136.5	24-35-46	81	18	11	72								Munsell color 7.5YR 4/4
			Borehole terminated at a depth of 136.5' on 9/18/2013. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.																
197.35	140		See Borehole Log Legend for soil classification chart and key to test data and sampler type.																

REPORT TITLE				HOLE ID
BORING RECORD				S0090R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 7 of 7

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	0		SILTY SAND (SM); loose; brown; dry; little fines, fine SAND; [FILL].		B-01	0.0			60	60	48							COMP, RV
			CLAYEY SAND (SC); medium dense; brown; moist; few fines, fine SAND; subrounded to rounded.			5.0												
335.44	5				SS-02	5.0	6-7-8	15	18	11.5								Fizzing vigorously; medium plasticity
						6.5							8.4					
			SILTY SAND (SM); medium dense; brown; moist; few fines, fine SAND; subrounded to rounded.															
330.44	10				MC-03	10.0	5-7-8	15	18	11								Gravel falling in the hole
						11.5						118.6	8.3					DS
			Poorly graded SAND with SILT (SP-SM); medium dense; dark yellowish brown; dry; few fines, medium SAND; subrounded to rounded; [NATIVE].															
325.44	15				SS-04	15.0	7-9-12	21	18	10								
						16.5					10							
			SILTY SAND (SM); dense; grayish brown; dry; some fines; fine SAND.															
320.44	20																	

(continued)

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	1 of 9	

PROJECT NAME				PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield				**131577-00**
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
SV/NG	Sep-19-13	Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)	S0091R
DRILLING CONTRACTOR/DRILLER			IN-SITU TESTING	SURFACE ELEVATION
Gregg Drilling/D. McMackin			PS Logging	340.44 ft (NAVD88)
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')			D-1 (B53)	6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")			Automatic, 140 lbs, 30-inch drop	78%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout			Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	20				MC-O5	20.0 21.5	20-32-40	72	18	15	28	120.0	8.6					Hardpan soil
			Poorly graded SAND (SP); very dense; grayish brown; moist; trace fines, medium to fine SAND; subrounded to rounded.															
315.44	25				SS-06	25.0 26.5	22-35-45	80	18	11			6.8					
			SANDY SILT (ML); hard; brown; moist; little SAND; fine SAND; no plasticity; low dry strength; low toughness.															
310.44	30				MC-07	30.0 31.5	17-19-23	42	18	15		93.7	21.4			UU 1010		PP: 5.0, 5.0, 5.0 tsf TV: .50, .50, .60 tsf
305.44	35		- SILT (ML); few SAND; micaceous.		SS-08	35.0 36.5	18-34-39	73	18	9.5	91							PP: 4.5, 3.5, 2.0 tsf
			Poorly graded SAND with SILT (SP-SM); very dense; yellowish brown; moist; few fines; medium SAND; subrounded to rounded.															
300.44	40																	

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	2 of 9

CALIFORNIA High-Speed Rail Authority

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	40				MC-09	40.0 41.0	37-50/5.5"	50/5.5"	11.5	10.5	5	109.4	7.6					
295.44	45		CLAYEY SAND (SC); very dense; brown with occasional dark brown mottling; moist; little fines; fine SAND; subangular to subrounded; moderate cementation.		SS-10	45.0 46.5	14-26-29	55	18	10.5								Medium plasticity
290.44	50		Poorly graded SAND with SILT (SP-SM); very dense; brown; moist; little fines; fine SAND; subrounded to rounded; micaceous.		MC-11	50.0 51.5	23-31-45	76	18	15	11	107.0	7.2					DS
285.44	55		SILTY SAND (SM); very dense; brown; moist; little fines; fine SAND; subrounded to rounded; micaceous.		SS-12	55.0 56.5	18-31-43	74	18	11	19							
280.44	60		Poorly graded SAND with SILT (SP-SM); very dense; yellowish brown mottled with red; moist; few fines; medium SAND; micaceous.															

(continued)

REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	3 of 9

CALIFORNIA High-Speed Rail Authority

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CALIFORNIA HIGH-SPEED TRAIN

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	60				MC-13	60.0 61.5	33-44-50	94	18	16	10							Munsell color 2.5YR 4/8 red
			SANDY SILT (ML/SM); very stiff; light brown; moist; some SAND; fine SAND; weak cementation.															
275.44	65				SS-14	65.0 66.5	18-29-36	65	18	8	51							Munsell color 7.5YR 6/4
			SILTY SAND (SM); very dense; grayish brown; moist; some fines; fine SAND.															
270.44	70				MC-15	70.0 71.5	25-43-50	93	18	14								
			SANDY SILT (ML); very stiff; brown mottled with reddish brown; moist; some SAND; low plasticity; low dry strength; slow dilatancy; low toughness; frequent SILTY SAND pockets.															
265.44	75				SS-16	75.0 76.5	20-43-39	82	18	8								PP: 2.75 tsf
			SILTY SAND (SM); very dense; grayish brown mottled with reddish brown; moist; little fines; fine SAND; weak cementation.															
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; moist; few fines; fine SAND.															
260.44	80																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	4 of 9	

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	80																	
					MC-17	80.0 80.8	50-50/3.5"	50/3.5"	9.5	7	10							
255.44	85		- brown.		SS-18	85.0 85.9	34-50/5"	50/5"	11	8	14							
			SILTY SAND (ML/SM); very dense; grayish brown variegated reddish brown; moist; little to some fines, fine SAND.															
250.44	90				MC-19	90.0 91.3	23-45-50/5"	95/11"	15	11	52	121.5	12.4					DS
			SILTY SAND (SM); very dense; reddish brown; moist; some fines; fine to medium SAND.															
245.44	95				SS-20	95.0 96.4	24-28-50/5"	78/11"	17	10	43							
			CLAYEY SAND (SC); very dense; reddish brown; moist; some fines; fine to medium SAND; subangular to subrounded.															
240.44	100																	

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RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	5 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	100				MC-21	100.0 101.3	24-50-50/3"	100/9"	15	12		125.5	11.5					TXCD
235.44	105		- brown; micaceous.		SS-22	105.0 106.5	21-33-50/5.5"	83/11.5"	17.5	11								Driller noticed a change in the return of cuttings
			Poorly graded SAND with SILT (SP-SM); very dense; grayish brown; wet; few fines; fine SAND; micaceous.															
230.44	110				MC-23	110.0 110.8	50-50/4"	50/4"	10	9	9	107.5	8.8					
			SILTY SAND (SM); very dense; brown variegated reddish brown; wet; trace fines; fine SAND.															
225.44	115				SS-24	115.0 116.5	28-42-43	85	18	9								
			Well graded SAND with SILT (SW-SM); very dense; dark yellowish brown with grayish brown and reddish brown; few fines; medium SAND; micaceous.															
220.44	120																	

(continued)

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	J. Borghesi	5-14-14	6 of 9	

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV/NG	BEGIN DATE: Sep-19-13	COMPLETION DATE: Sep-24-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2350322.75 / E6203198.316 (NAD83 CA Z5)	HOLE ID: S0091R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 340.44 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	120				MC-25	120.0 120.8	47-50/3.5"	50/3.5"	9.5	8.5	9	112.8	9.8					
			Poorly graded SAND (SP); very dense; grayish brown; wet; trace fines; medium to fine SAND; micaceous.															
215.44	125				SS-26	125.0 126.4	28-46-50/5"	96/11"	17	8.5								Grains of sand colored reddish brown, gray, black and grayish brown
210.44	130		- medium SAND, medium to fine; angular to subangular.		MC-27	130.0 130.8	43-50/4"	50/4"	10	9								Almost no fines
205.44	135		- trace fines; fine SAND.		SS-28	135.0 135.8	31-50/5"	50/5"	10	7								
200.44	140																	

(continued)

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 7 of 9

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY / BEGIN DATE / COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)		HOLE ID
SV/NG / Sep-19-13 / Sep-24-13	N2350322.75 / E6203198.316 (NAD83 CA Z5)		S0091R
DRILLING CONTRACTOR/DRILLER	IN-SITU TESTING		SURFACE ELEVATION
Gregg Drilling/D. McMackin	PS Logging		340.44 ft (NAVD88)
DRILLING METHOD	DRILL RIG		BOREHOLE DIAMETER
AUGER(0'-5'), ROTARY(5'-165')	D-1 (B53)		6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)	SPT HAMMER TYPE		HAMMER EFFICIENCY, ERi
MC(2-1/2"), SPT(1-3/8")	Automatic, 140 lbs, 30-inch drop		78%
BOREHOLE BACKFILL AND COMPLETION	GROUNDWATER READINGS	DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Neat cement grout		Not Recorded / Not Recorded	165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	140		- moist; trace fines; medium to fine SAND.		MC-29	140.0 140.8	50-50/3.5"	50/3.5"	9.5	8.5								
195.44	145		- reddish brown; wet; subrounded to subangular.		SS-30	145.0 146.0	40-50/5.5"	50/5.5"	11.5	7.5								
190.44	150		- subrounded to rounded.		MC-31	150.0 150.8	50-50/3"	50/3"	9	7								End of sampling; drilled to 165.0' to create a rathole for the geophysical tool; no significant change in cuttings or drilling to 165.0'
185.44	155																	
180.44	160																	

(continued)

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE				HOLE ID
BORING RECORD				S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME				
California High-Speed Train				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
	J. Borghesi		5-14-14	8 of 9

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1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

PROJECT NAME			PROJECT NUMBER
California High-Speed Train Fresno to Bakersfield			**131577-00**
LOGGED BY: SV/NG	BEGIN DATE: Sep-19-13	COMPLETION DATE: Sep-24-13	BOREHOLE LOCATION (Lat/Long or North/East and Datum): N2350322.75 / E6203198.316 (NAD83 CA Z5)	HOLE ID: S0091R
DRILLING CONTRACTOR/DRILLER: Gregg Drilling/D. McMackin			IN-SITU TESTING: PS Logging	SURFACE ELEVATION: 340.44 ft (NAVD88)
DRILLING METHOD: AUGER(0'-5'), ROTARY(5'-165')			DRILL RIG: D-1 (B53)	BOREHOLE DIAMETER: 6.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID): MC(2-1/2"), SPT(1-3/8")			SPT HAMMER TYPE: Automatic, 140 lbs, 30-inch drop	HAMMER EFFICIENCY, ERi: 78%
BOREHOLE BACKFILL AND COMPLETION: Neat cement grout			GROUNDWATER READINGS: DURING DRILLING: Not Recorded; AFTER DRILLING (DATE): Not Recorded	TOTAL DEPTH OF BORING: 165 ft

Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method / Casing Depth	Remarks/ Other Tests
	160																	
175.44	165		Borehole terminated at a depth of 165.0' on 9/24/2013. GeoVision conducted P-S logging in this borehole. Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table. See Borehole Log Legend for soil classification chart and key to test data and sampler type.															
170.44	170																	
165.44	175																	
160.44	180																	

CALIFORNIA High-Speed Rail Authority

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REPORT TITLE: BORING RECORD				HOLE ID: S0091R
DIST.	COUNTY	ROUTE	POSTMILE	EA
PROJECT OR BRIDGE NAME: California High-Speed Train				
BRIDGE NUMBER	PREPARED BY: J. Borghesi		DATE: 5-14-14	SHEET: 9 of 9

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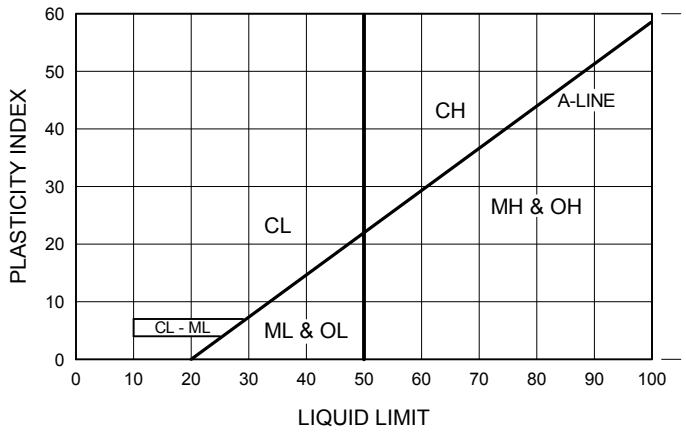
1.0.3A BOREHOLE LOG - CHSTP F-B REV CHSR F-B_MASTER DATABASE.GPJ ARUP DOTR LIBRARY_MASTER LIBRARY.GLB 5/14/14

LogBlkISOIL KEY - CHSR F-B 2/12/2014 10:02:35 PM

INDEXED SOIL CLASSIFICATIONS

GRAPHIC	SYMBOL	DESCRIPTION	MAJOR DIVISIONS				
	GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	**CLEAN GRAVELS** (LITTLE OR NO FINES)	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	FOR VISUAL CLASSIFICATION, THE 1/4" SIZE MAY BE USED AS EQUIVALENT TO THE NO.4 SIEVE SIZE	**COARSE-GRAINED SOILS** MORE THAN HALF OF MATERIAL IS LARGER THAN NO.200 SIEVE SIZE	THE NO.200 U.S. STANDARD SIEVE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE
	GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES					
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	**GRAVELS WITH FINES** (APPRECIABLE AMOUNT OF FINES)				
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES					
	SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	**CLEAN SANDS** (LITTLE OR NO FINES)	**SANDS** MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE			
	SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES					
	SM	SILTY SANDS, SAND-SILT MIXTURES	**SANDS WITH FINES** (APPRECIABLE AMOUNT OF FINES)				
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES					
	ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	**SILTS & CLAYS** LIQUID LIMIT LESS THAN 50			**FINE-GRAINED SOILS** MORE THAN HALF OF MATERIAL IS SMALLER THAN NO.200 SIEVE SIZE	
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS					
	OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY					
	MH	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF HIGH PLASTICITY	**SILTS & CLAYS** LIQUID LIMIT GREATER THAN 50				
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS					
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS					
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	**HIGHLY ORGANIC SOILS**				
	OS	OILY SEDIMENTS					

PLASTICITY CHART



KEY TO TEST DATA

COLL = COLLAPSE POTENTIAL
CONSOL = CONSOLIDATION
CORR = CORROSIVITY
DS = DIRECT SHEAR
EI = EXPANSION INDEX
ORG = ORGANIC CONTENT
PP = POCKET PENETROMETER
RV = R-VALUE
SIEVE = SIEVE ANALYSIS
TV = POCKET TORVANE
TXCD = CONSOLIDATED DRAINED TRIAXIAL COMPRESSION

KEY TO SAMPLER TYPE

- BULK
- MC = MODIFIED CALIFORNIA SAMPLER
- PS = PITCHER SAMPLER
- SPT = STANDARD PENETRATION TEST SAMPLER
- ST = SHELBY TUBE SAMPLER
- NO RECOVERY

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SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

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Appendix C
Cone Penetration Test Records

For CPT Data, see CD

Table C-1
Summary of Cone Penetrometer Testing Locations, Depths, and In Situ Testing

Cone Penetration Test ID	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Hand-Auger / Pre-Drill Depths (ft)	Total Depth of Drilling (ft)	In Situ Testing	
						SCPT[1]	PPDT[2]
S0243CPT	6,442,716	1,806,925	219.3	0 to 5	100.2		✓
S0246CPT	6,442,635	1,801,606	220.6	0 to 5	100.2		✓
S0248CPT	6,445,424	1,796,396	229.5	0 to 5	100.2		✓
S0249CPT	6,442,754	1,796,384	227.2	0 to 5	115.2		✓
S0252CPT	6,453,058	1,785,825	245.3	0 to 6	81.7		✓
S0254CPT	6,454,415	1,780,546	257.9	0 to 6	115.3		✓
S0257CPT	6,457,992	1,775,265	270.0	0 to 6	115.8		✓
S0260ACPT	6,463,639	1,769,923	277.9	0 to 5	100.1		✓
S0261CPT	6,166,462	2,437,960	285.6	0 to 6	82.4		✓
S0262CPT	6,166,646	2,435,542	292.7	0 to 6	115.2		✓
S0263CPT	6,166,524	2,434,477	295.1	0 to 6	119.1		✓
S0264CPT	6,166,402	2,432,730	299.1	0 to 6	115.5		✓
S0266CPT	6,166,316	2,429,029	307.3	0 to 6	157.5	✓	✓
S0267CPT	6,165,899	2,426,390	304.4	0 to 6	100.2		✓
S0268ACPT	6,166,194	2,423,817	310.1	0 to 6	100.1		✓
S0269CPT	6,166,139	2,420,973	312.6	0 to 6	100.1		✓
S0270CPT	6,166,239	2,425,142	310.2	0 to 6	85.1		✓
S0271CPT	6,166,085	2,418,528	317.6	0 to 6	100.9		✓
S0272CPT	6,166,038	2,415,725	320.6	0 to 6	80.2		✓
S0273CPT	6,165,999	2,413,730	320.8	0 to 6	118.4		✓
S0274CPT	6,163,925	2,413,176	317.6	0 to 6	98.6		✓
S0279CPT	6,165,174	2,407,438	328.3	0 to 6	167.7	✓	✓
S0280CPT	6,165,549	2,405,616	331.4	0 to 6	152.4		✓
S0282CPT	6,165,533	2,404,273	331.0	0 to 6	127.0		✓
S0283CPT	6,165,487	2,402,685	332.0	0 to 5	121.7		✓
S0285ACPT	6,165,396	2,399,949	334.0	0 to 5	129.8		
S0287CPT	6,165,843	2,397,303	337.1	0 to 5	123.4		✓
S0289CPT	6,165,601	2,395,384	337.2	0 to 5	117.0	✓	✓
S0290ACPT	6,166,346	2,392,155	332.8	0 to 6	124.7		✓
S0292CPT	6,167,669	2,386,540	346.9	0 to 6	94.2		✓
S0295CPT	6,172,215	2,382,166	346.9	0 to 6	107.1		✓
S0297CPT	6,176,135	2,378,677	345.9	0 to 6	110.2	✓	✓
S0301CPT	6,178,686	2,375,973	346.6	0 to 6	100.6		✓
S0302CPT	6,179,458	2,374,889	346.1	0 to 6	136.7		✓
S0303CPT	6,180,790	2,373,518	347.6	0 to 6	158.5		✓
S0304CPT	6,182,589	2,371,976	345.4	0 to 6	163.4		✓

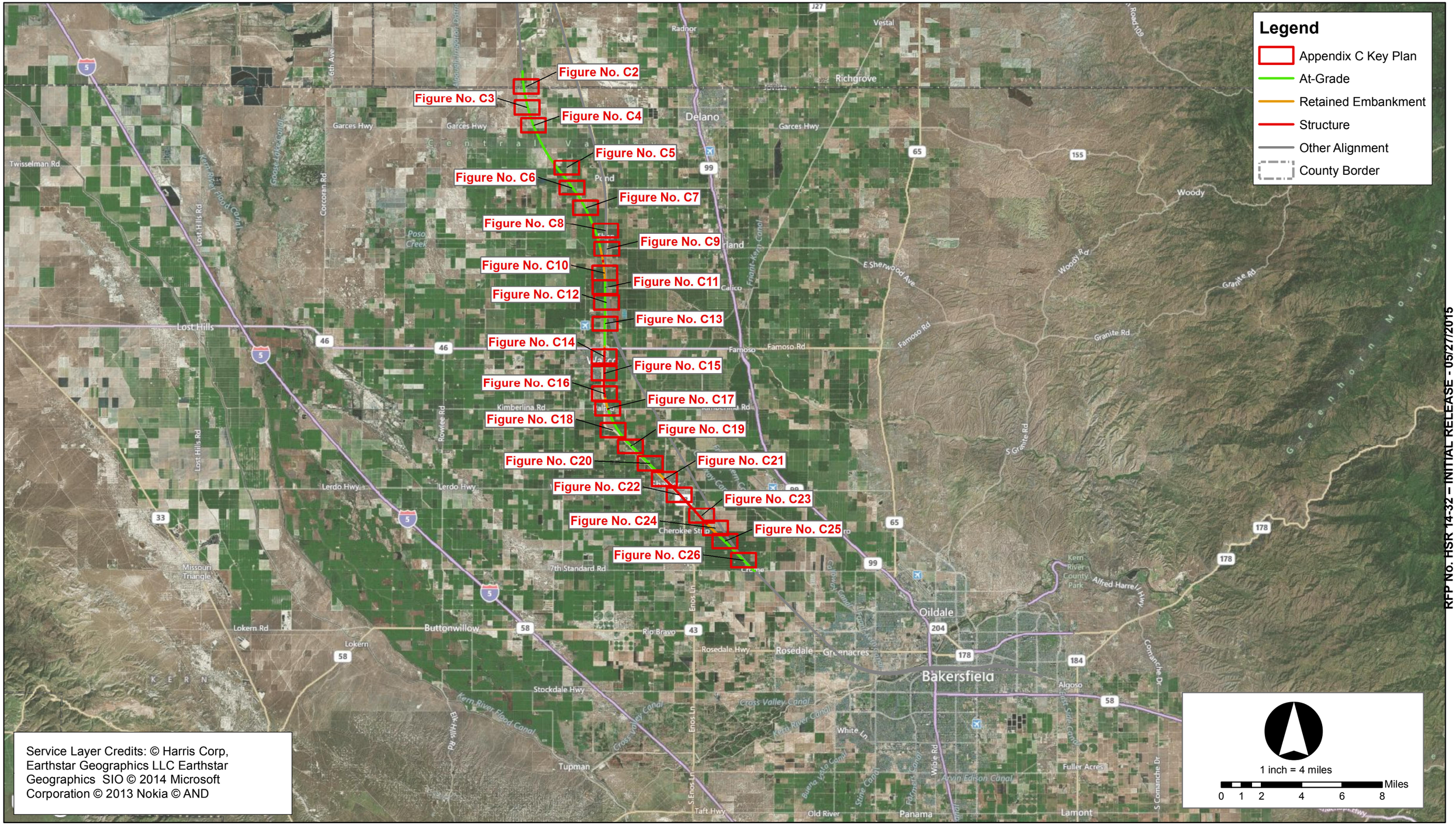
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Table C-1
Summary of Cone Penetrometer Testing Locations, Depths, and In Situ Testing

Cone Penetration Test ID	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Hand-Auger / Pre-Drill Depths (ft)	Total Depth of Drilling (ft)	In Situ Testing	
						SCPT[1]	PPDT[2]
S0305CPT	6,183,848	2,370,763	344.5	0 to 5	N/A		
S0308CPT	6,184,543	2,369,558	343.7	0 to 8	130.3		✓
S0309CPT	6,186,375	2,368,142	346.1	0 to 6	144.0		✓
S0312CPT	6,188,728	2,365,239	346.2	0 to 6	129.6	✓	✓
S0314CPT	6,191,084	2,362,598	343.7	0 to 6	150.3		✓
S0315CPT	6,192,801	2,361,118	343.4	0 to 6	115.2		
S0317CPT	6,194,339	2,359,524	341.6	0 to 6	110.1		✓
S0318ACPT	6,196,781	2,357,022	336.3	0 to 6	100.1		✓
S0318CPT	6,201,294	2,352,395	338.7	0 to 6	150.4	✓	✓
S0319CPT	6,202,086	2,351,617	339.7	0 to 5	150.1		✓

[1] SCPT = seismic cone penetration test
[2] PPDT = pore pressure dissipation test

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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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CALIFORNIA HIGH-SPEED TRAIN

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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
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CALIFORNIA HIGH-SPEED TRAIN

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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C3
May 2014

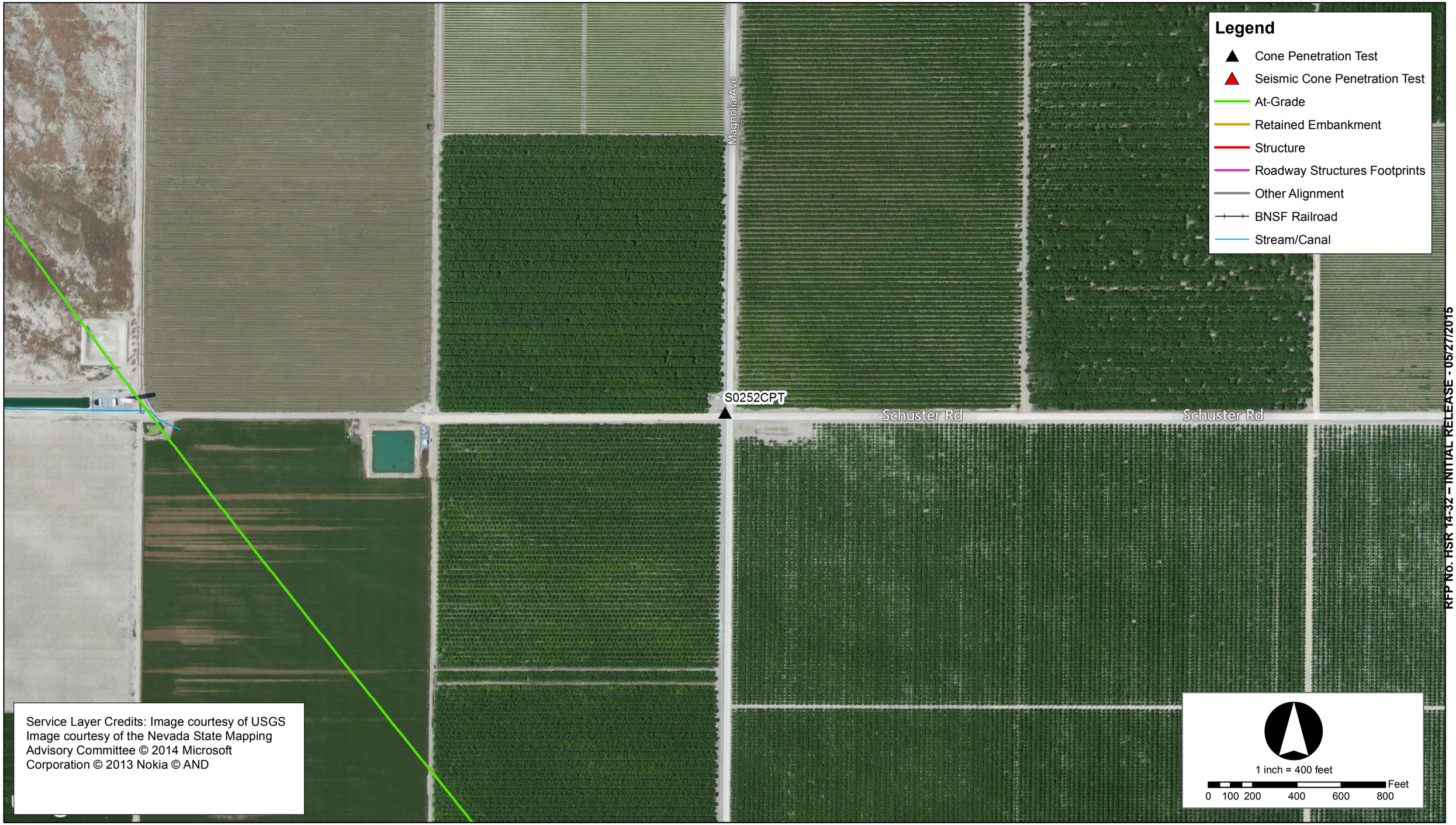


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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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Figure No. C6
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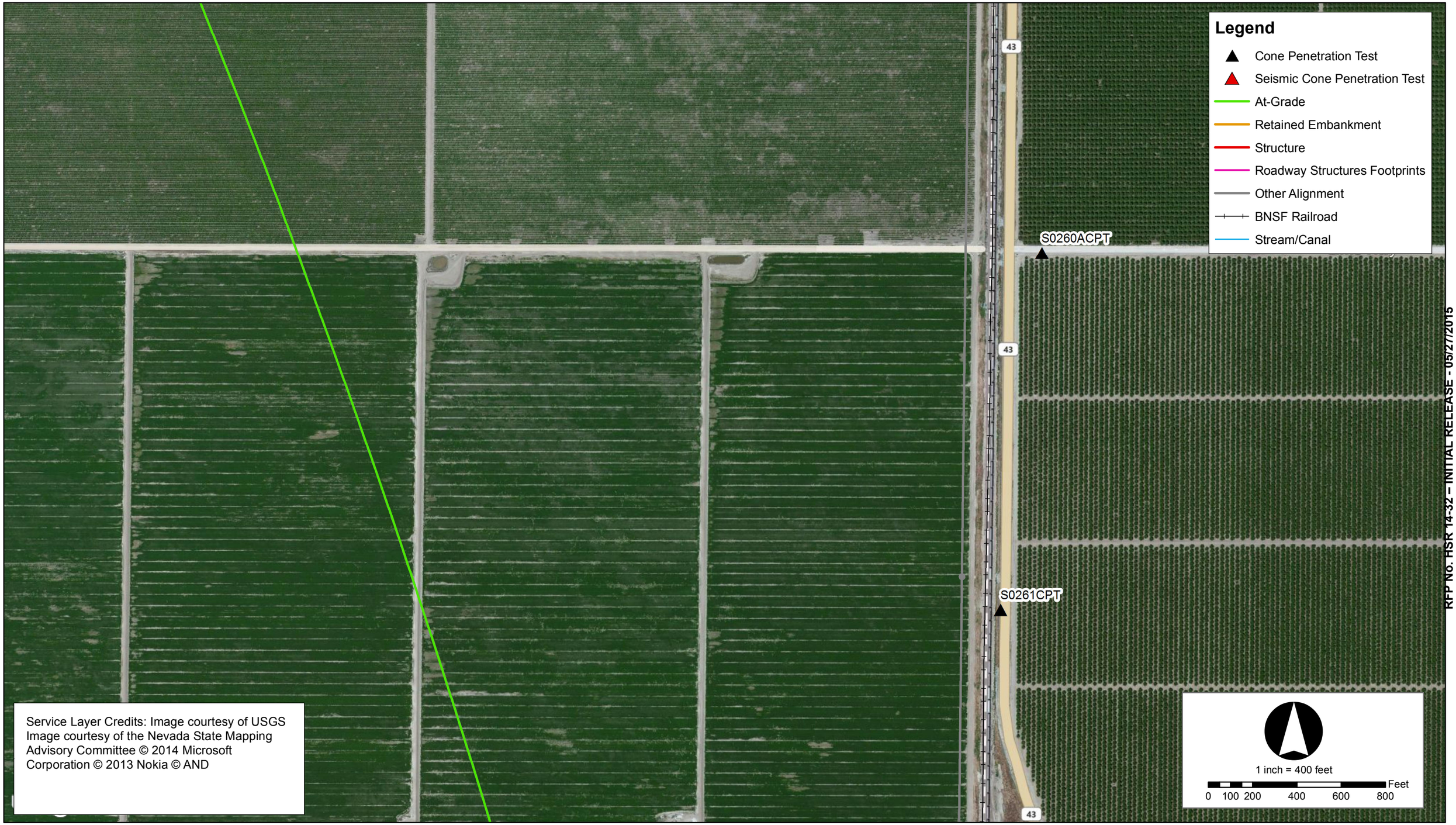


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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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Figure No. C7
May 2014

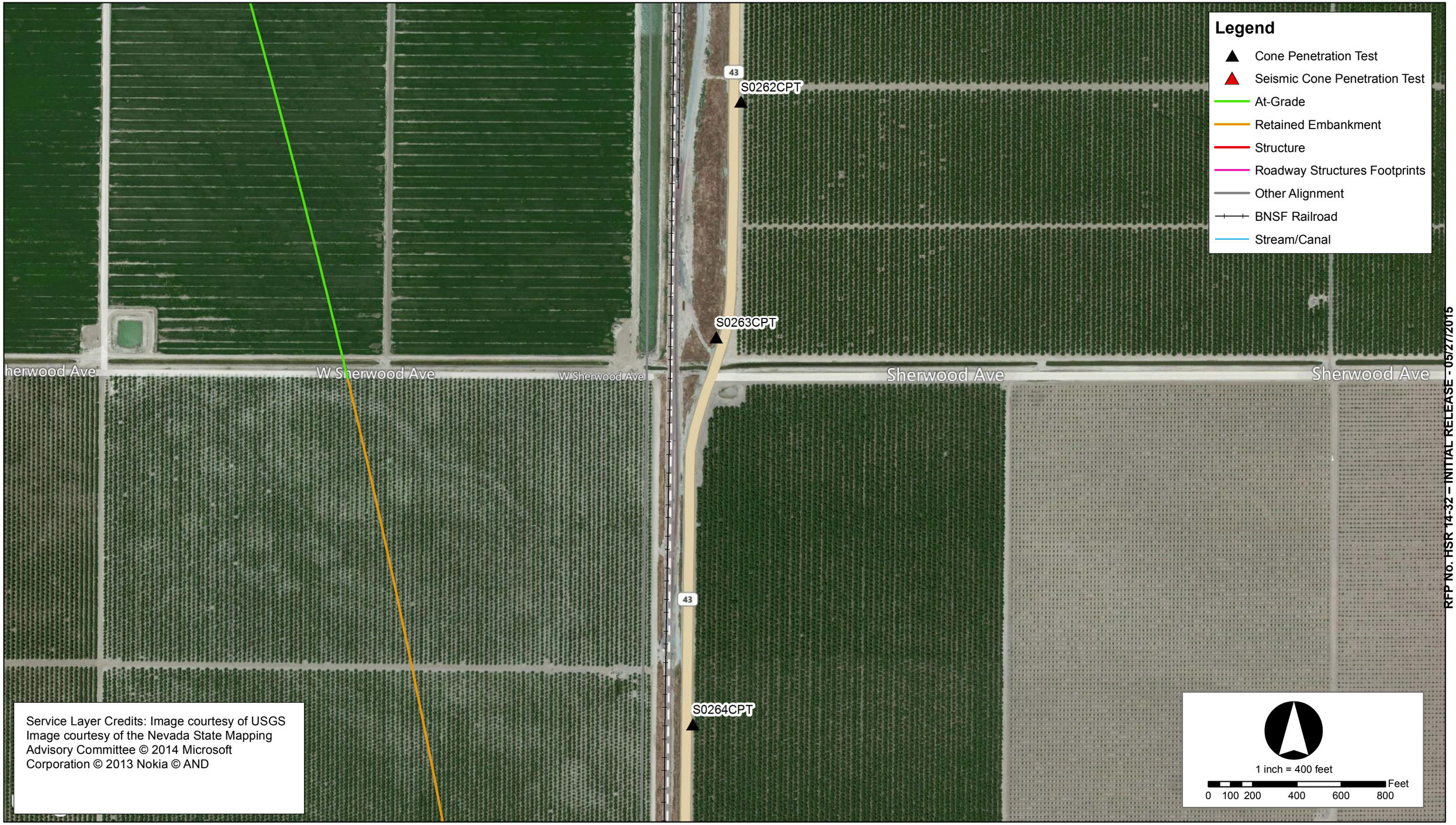


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CALIFORNIA HIGH-SPEED TRAIN

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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C10
May 2014

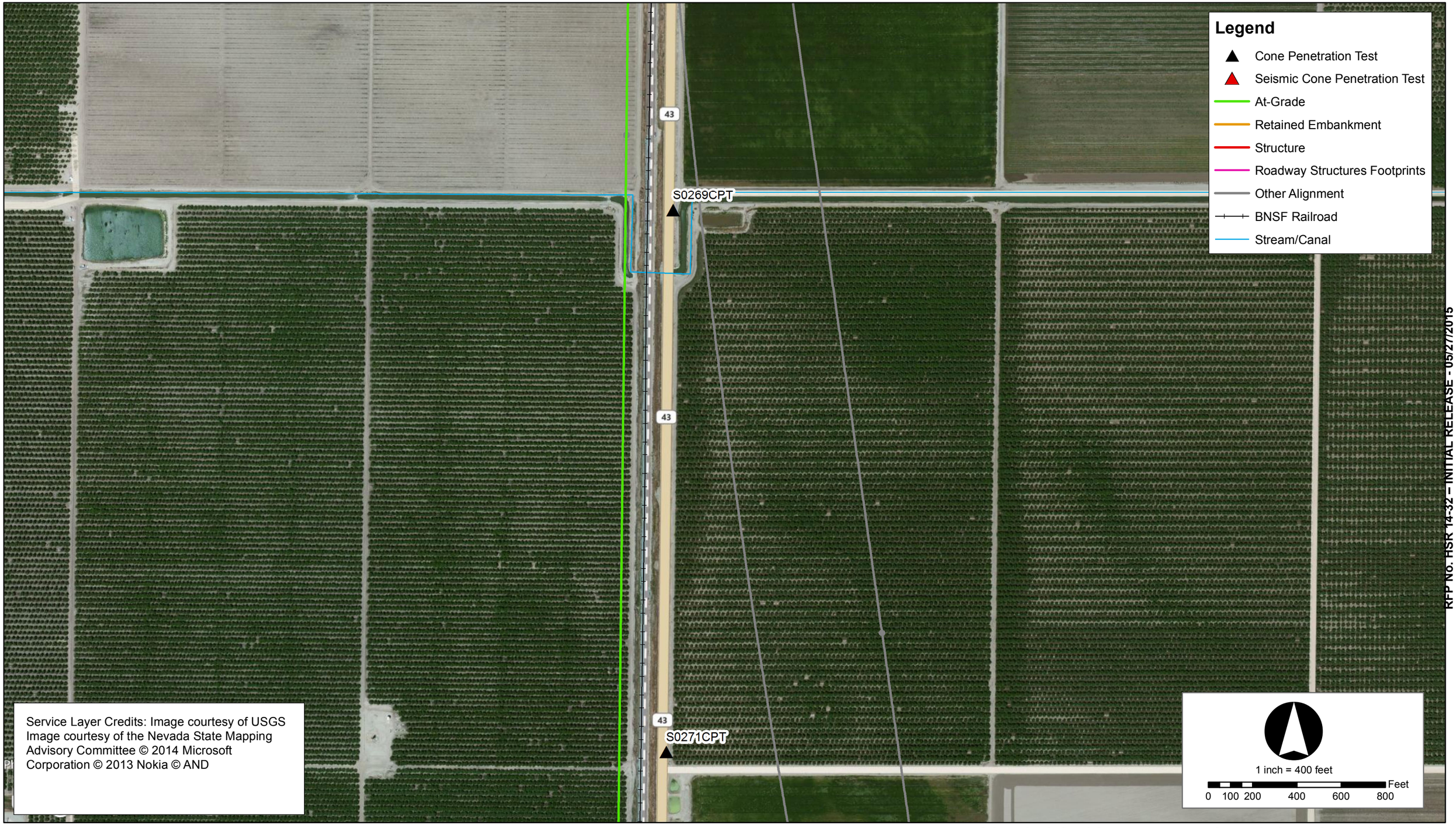


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CALIFORNIA HIGH-SPEED TRAIN

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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
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Figure No. C12
May 2014

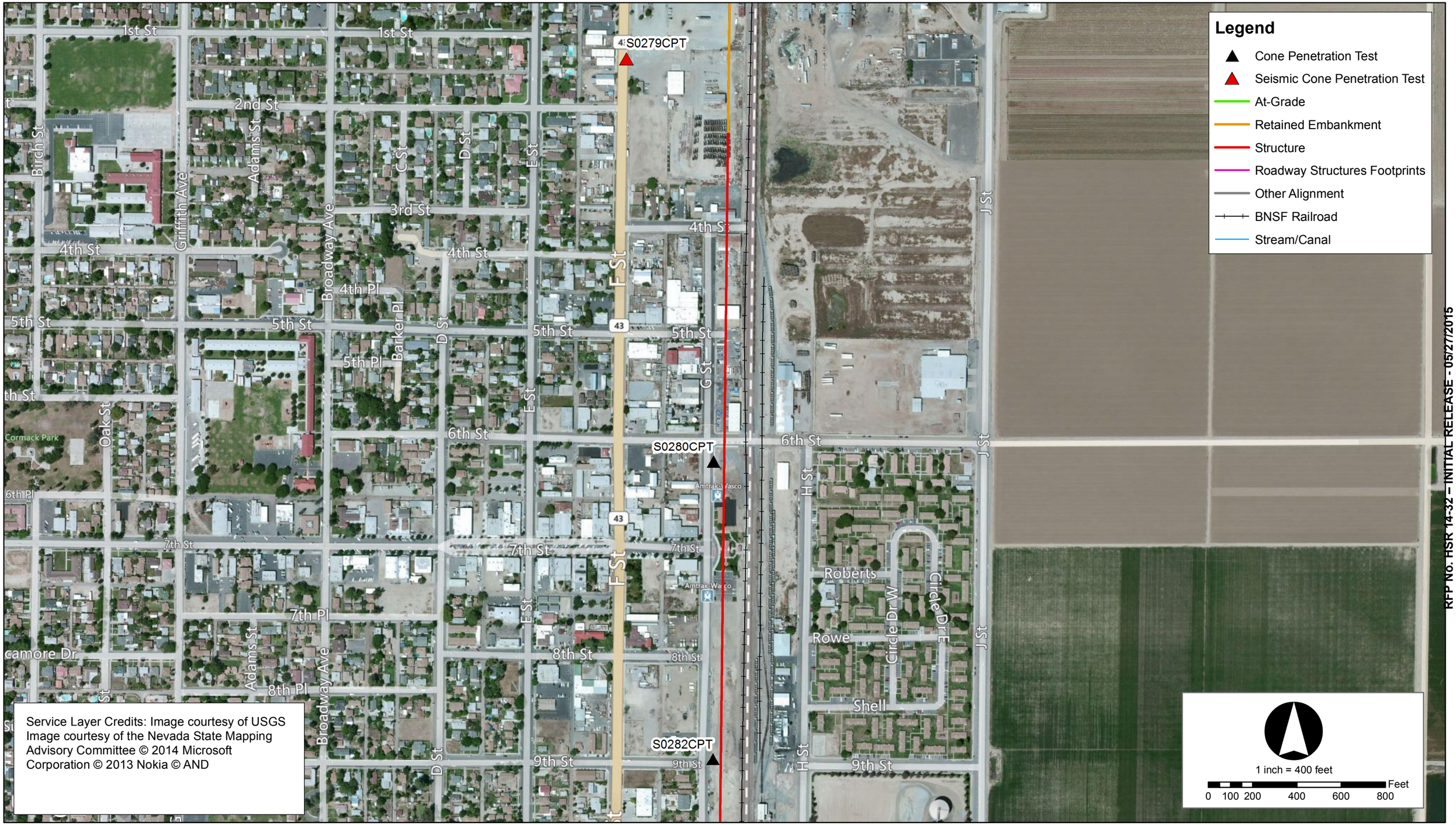


RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C13
May 2014

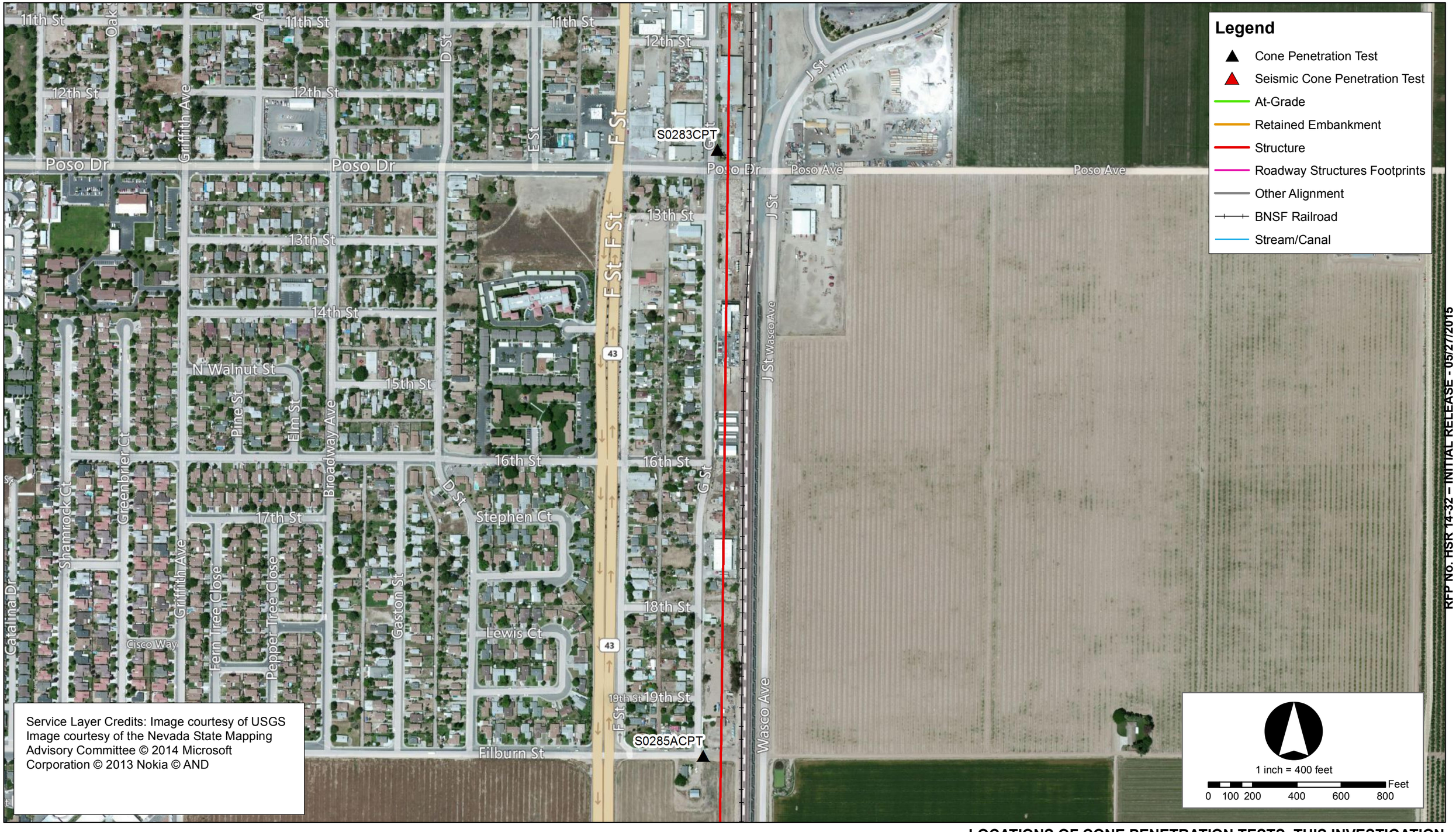


RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
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Geotechnical Data Report - Package 4
Figure No. C14
May 2014



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CALIFORNIA
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LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C15
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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C16
May 2014

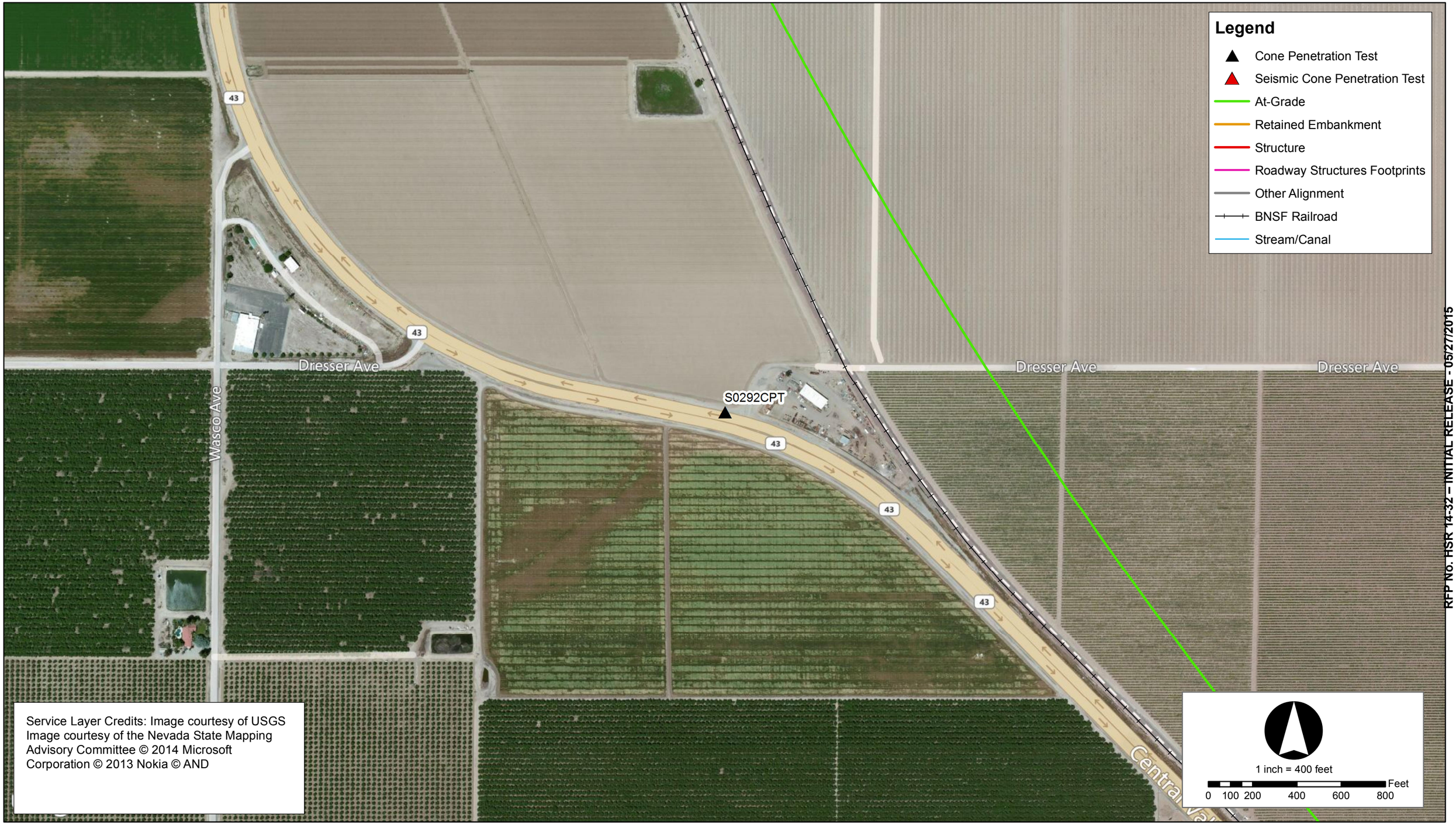


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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C17
May 2014



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California High-Speed Train

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C18
May 2014



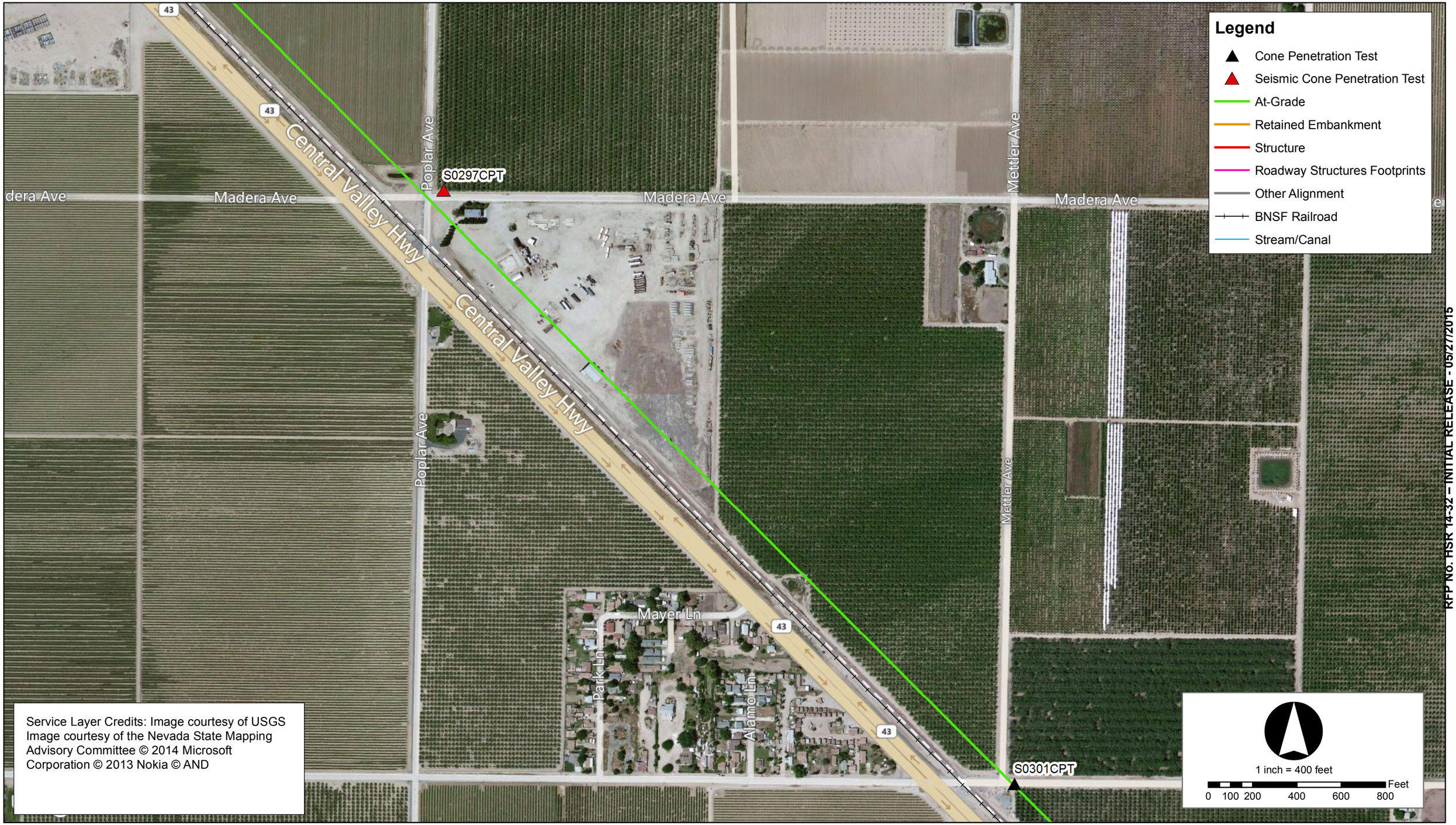
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C19
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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C20
May 2014



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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C21
May 2014



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CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C22
May 2014



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

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California High-Speed Train

CALIFORNIA High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C23
May 2014

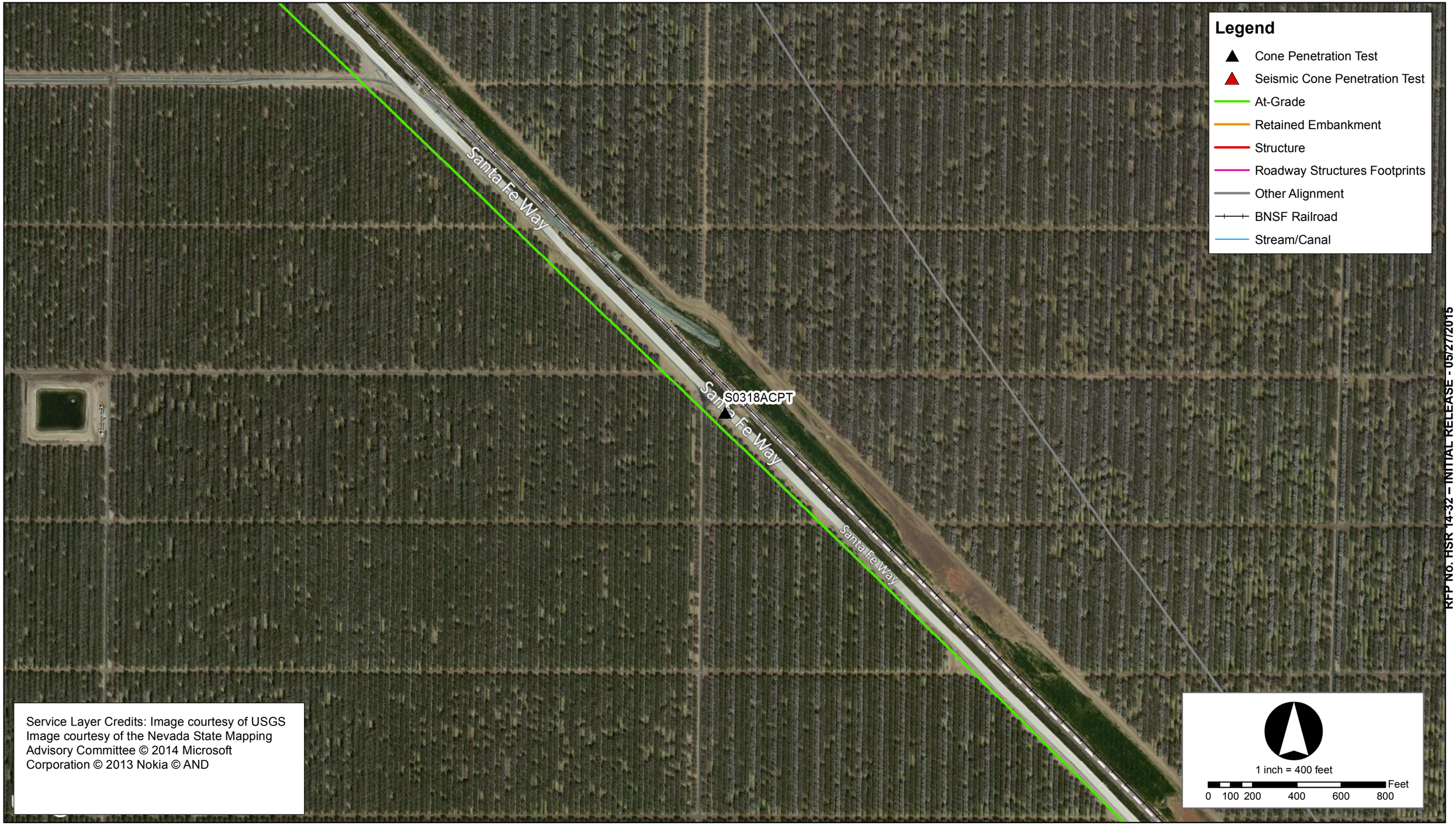


RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C24
May 2014



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

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CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
High-Speed Rail Authority

LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C25
May 2014



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

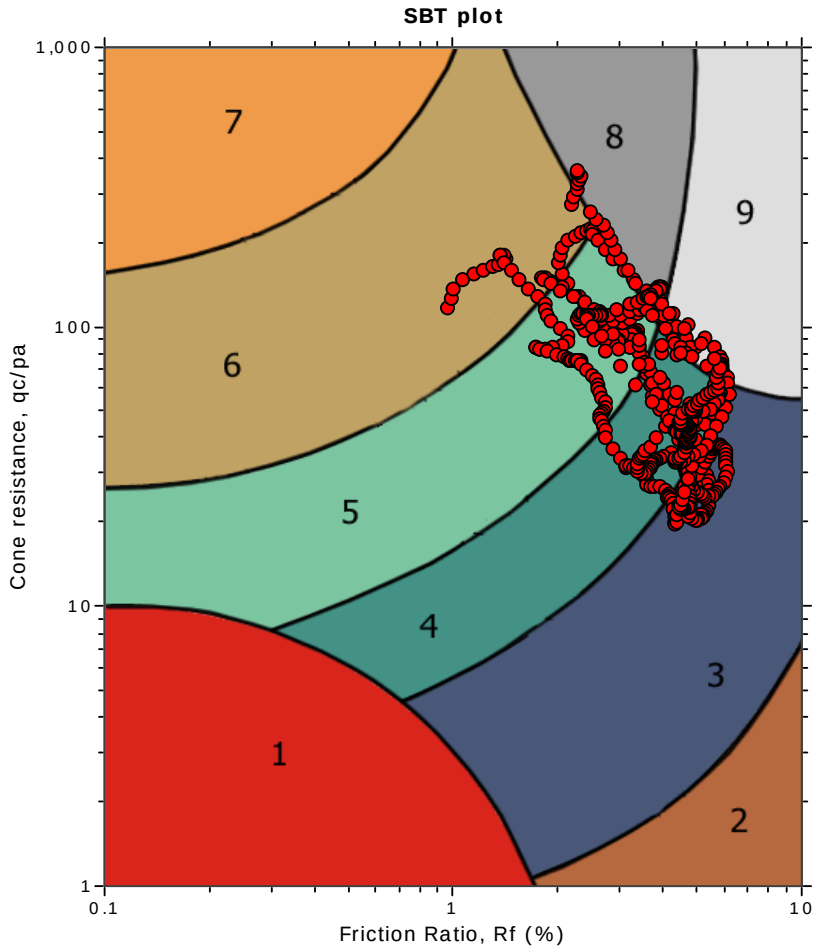
CALIFORNIA
High-Speed Rail Authority

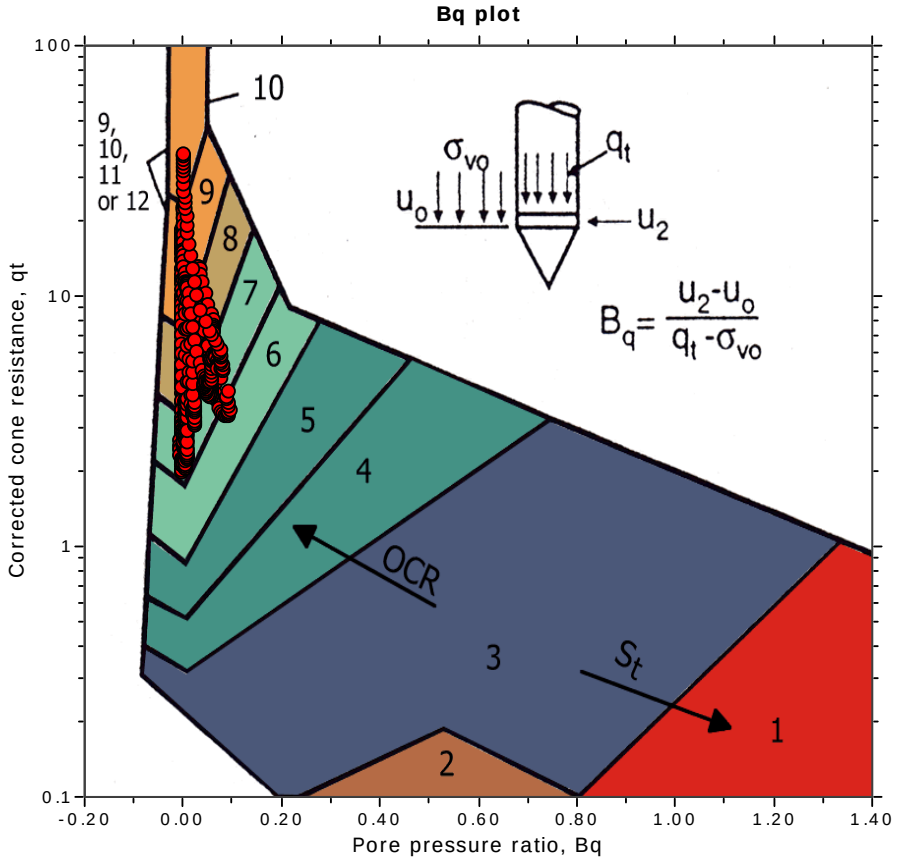
LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 4
Figure No. C26
May 2014

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0243CPT
Total depth: 100.23 ft
Surface Elevation: 219.33 ft
Coords: X:6442715.95, Y:1806925.00

SBT - Bq plots





SBT legend

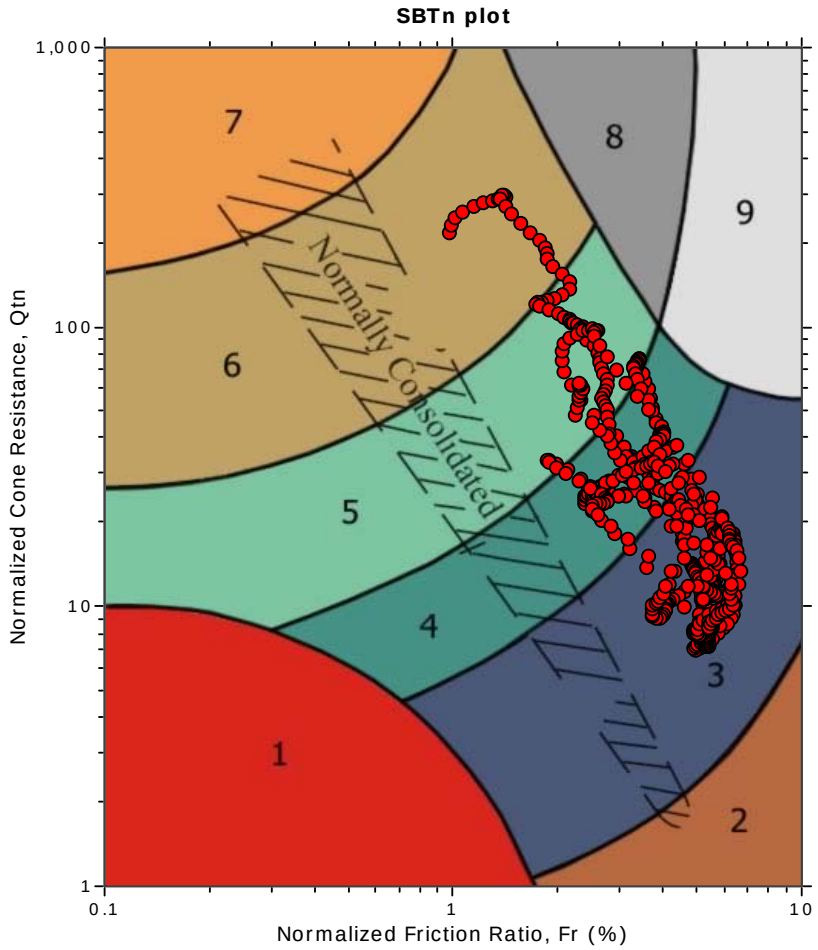
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

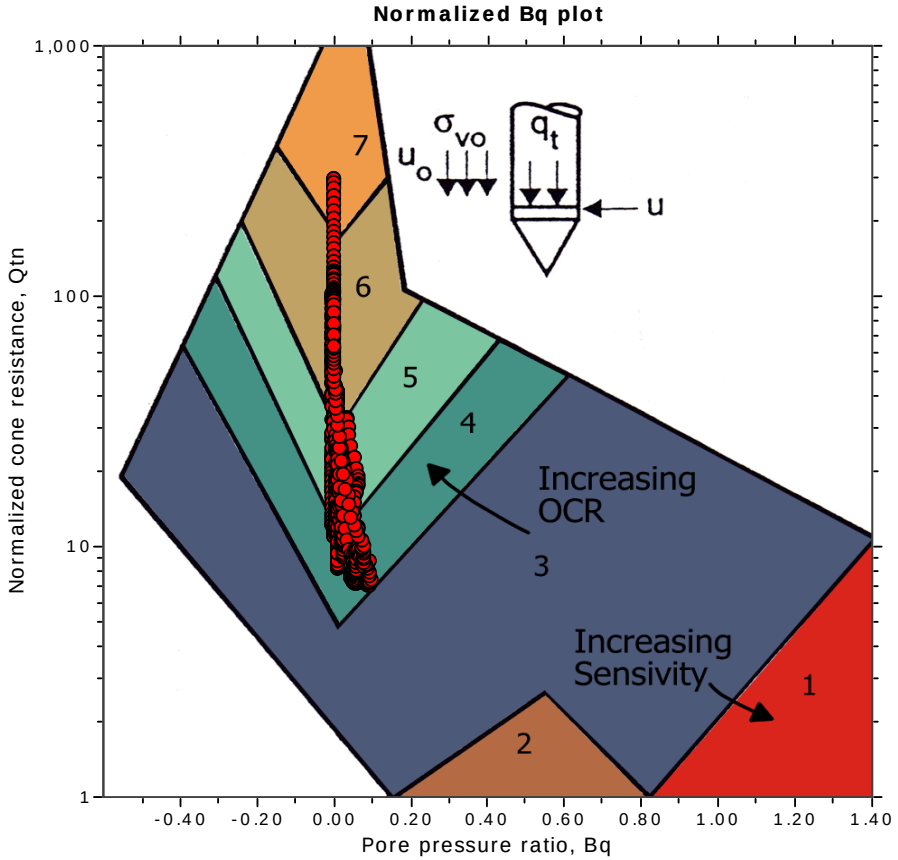
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0243CPT
Total depth: 100.23 ft
Surface Elevation: 219.33 ft
Coords: X:6442715.95, Y:1806925.00

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0243CPT

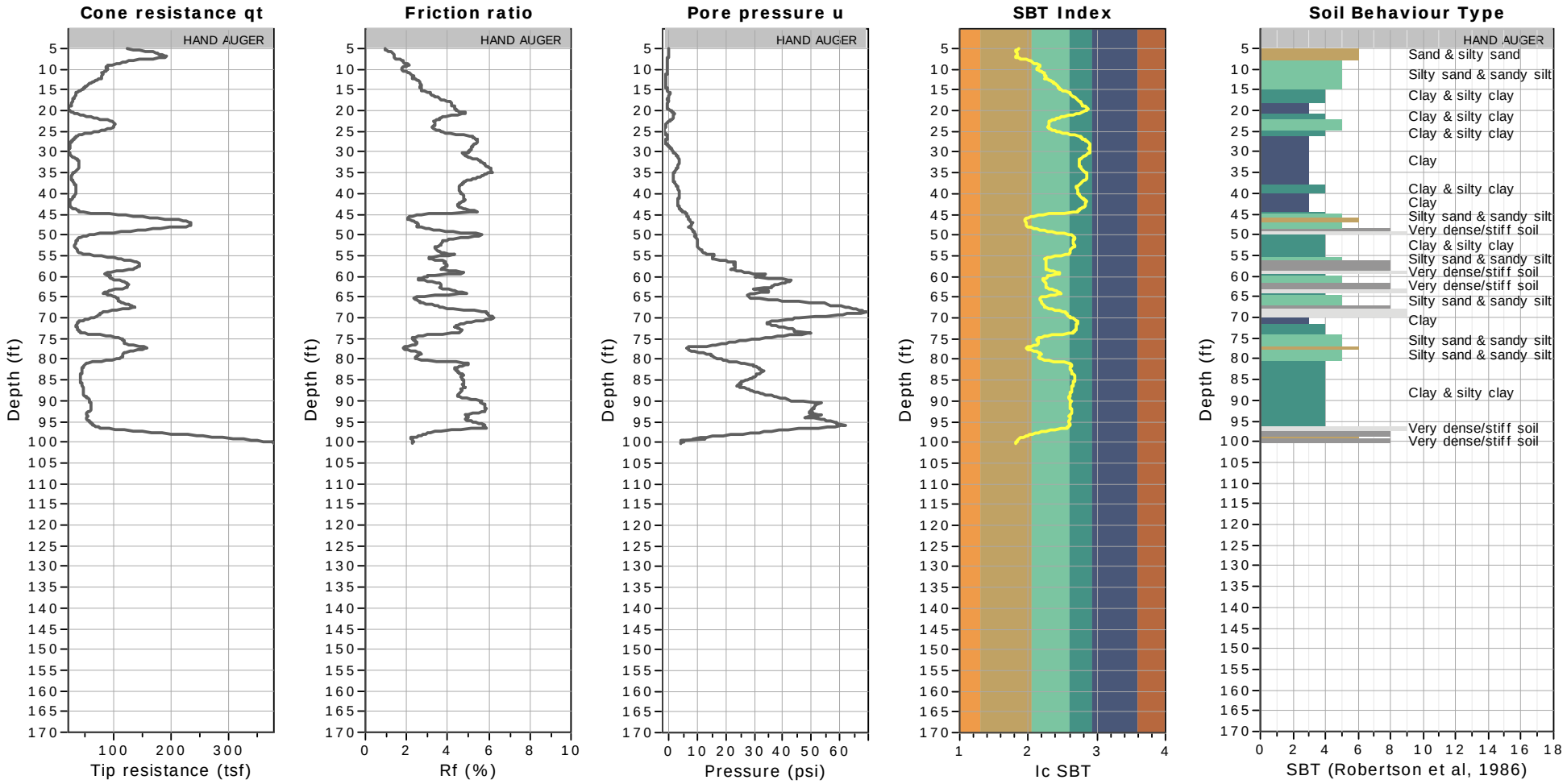
Total depth: 100.23 ft

Surface Elevation: 219.33 ft

Coords: X:6442715.95, Y:1806925.00

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

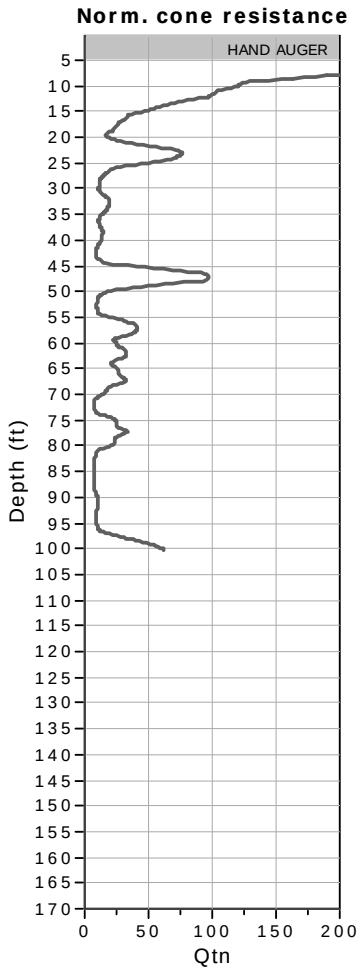
Location: Fresno-Bakersfield

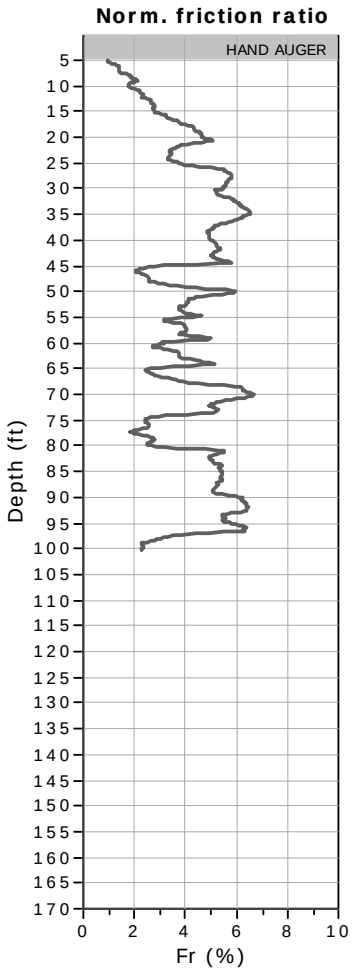
CPT: S0243CPT

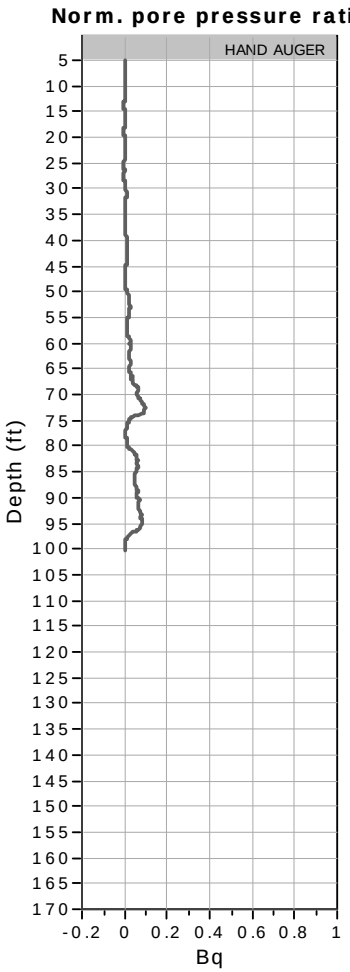
Total depth: 100.23 ft

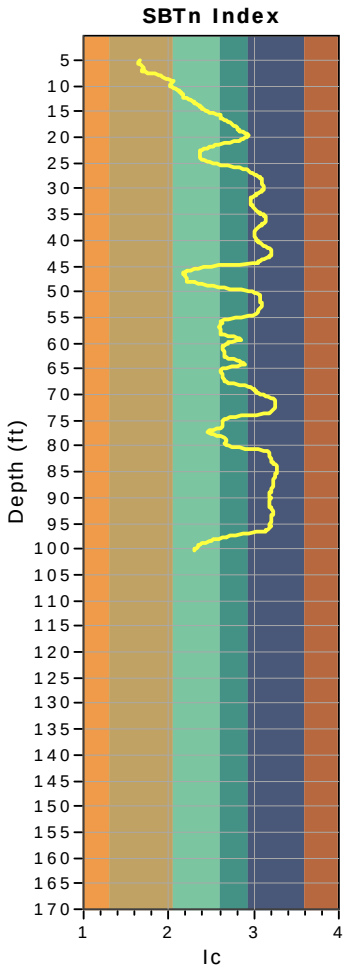
Surface Elevation: 219.33 ft

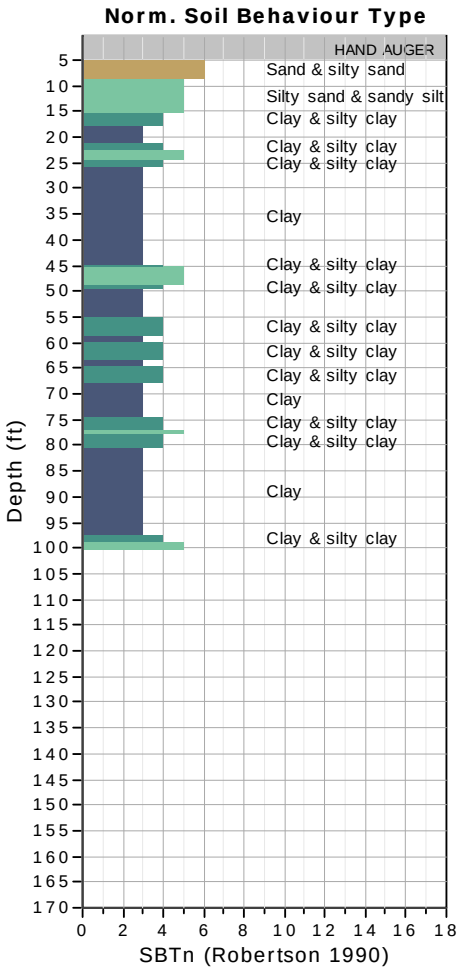
Coords: X:6442715.95, Y:1806925.00











RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

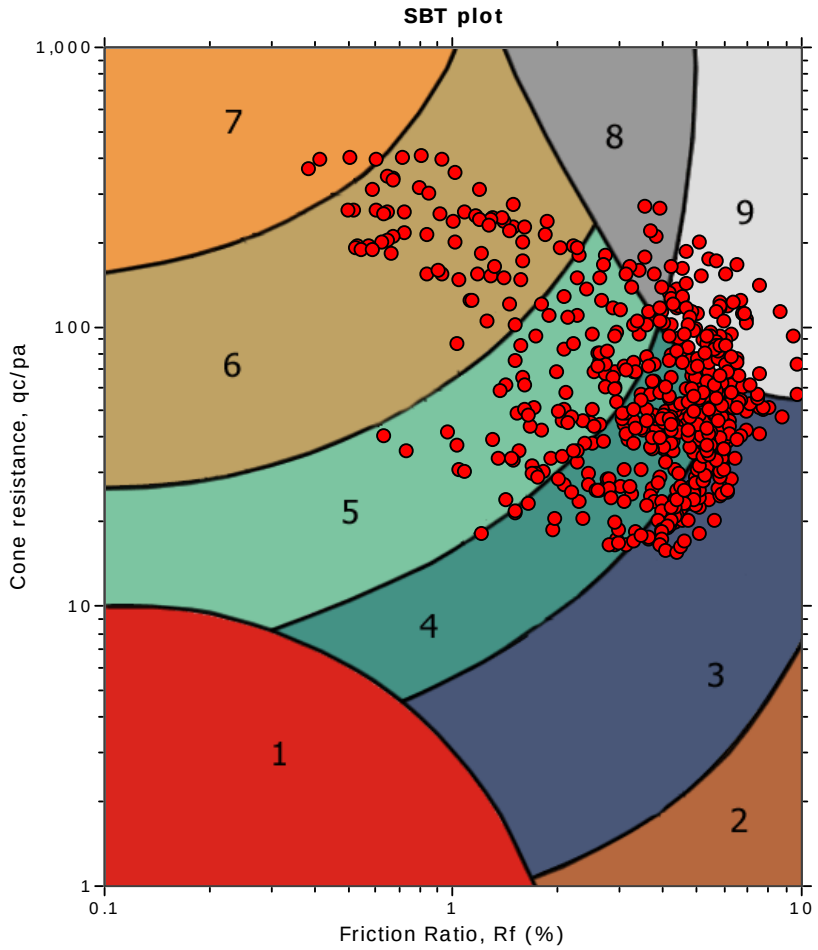
SBTn legend

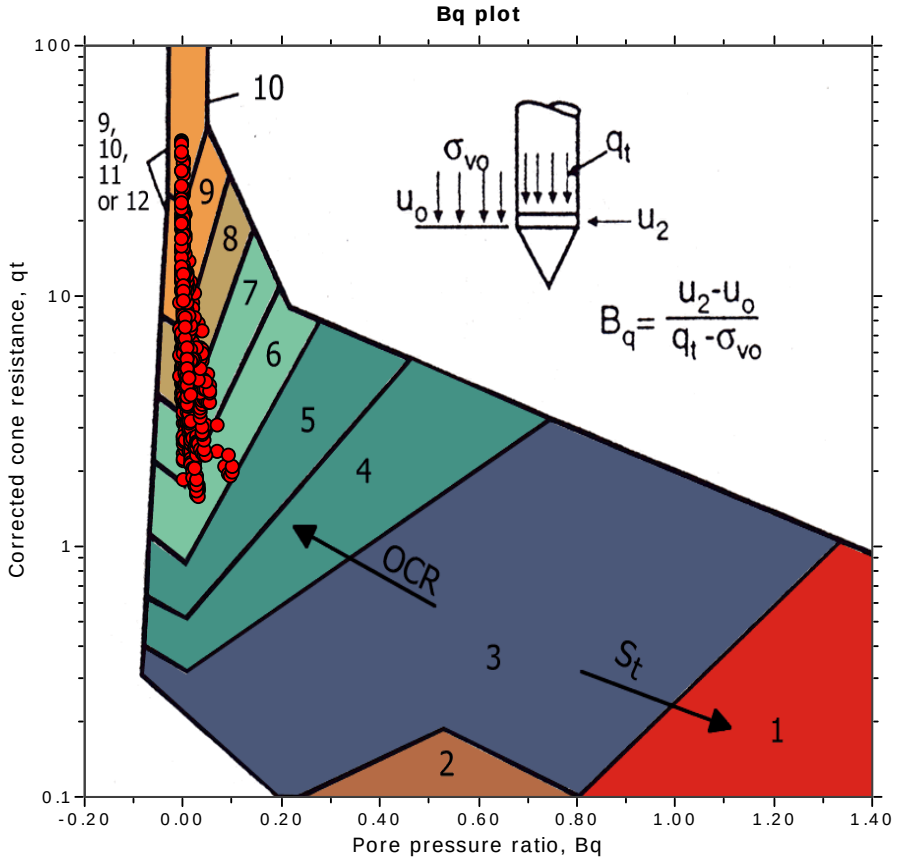
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0246CPT
Total depth: 100.23 ft
Surface Elevation: 220.64 ft
Coords: X:6442635.00, Y:1801605.91

SBT - Bq plots





SBT legend

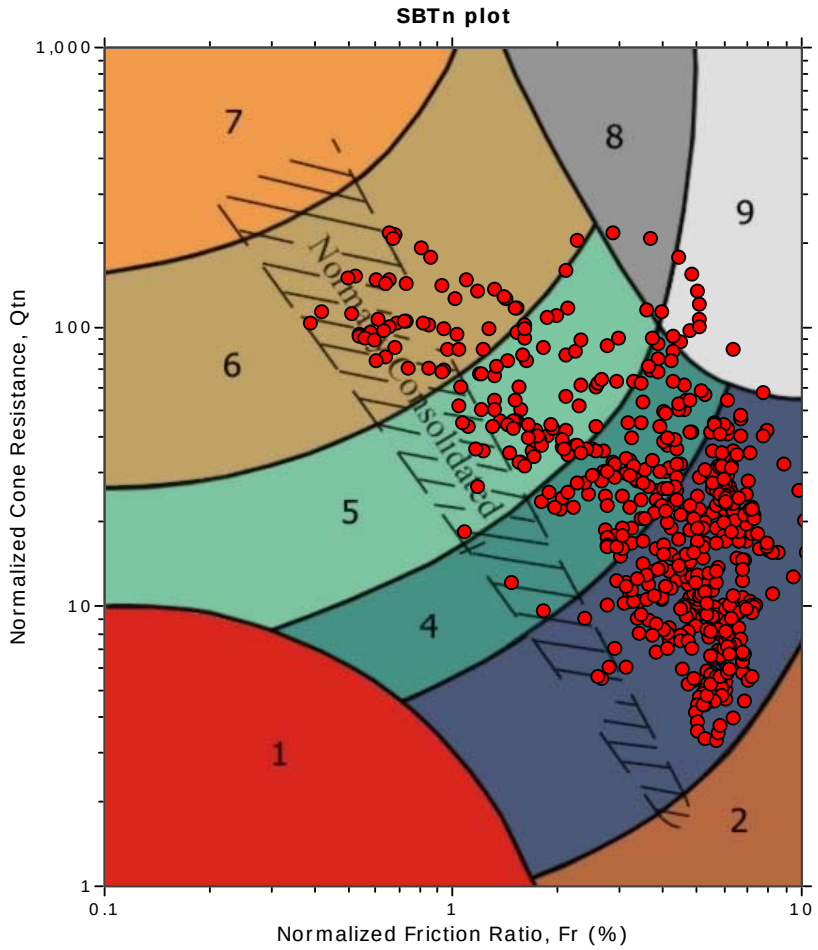
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

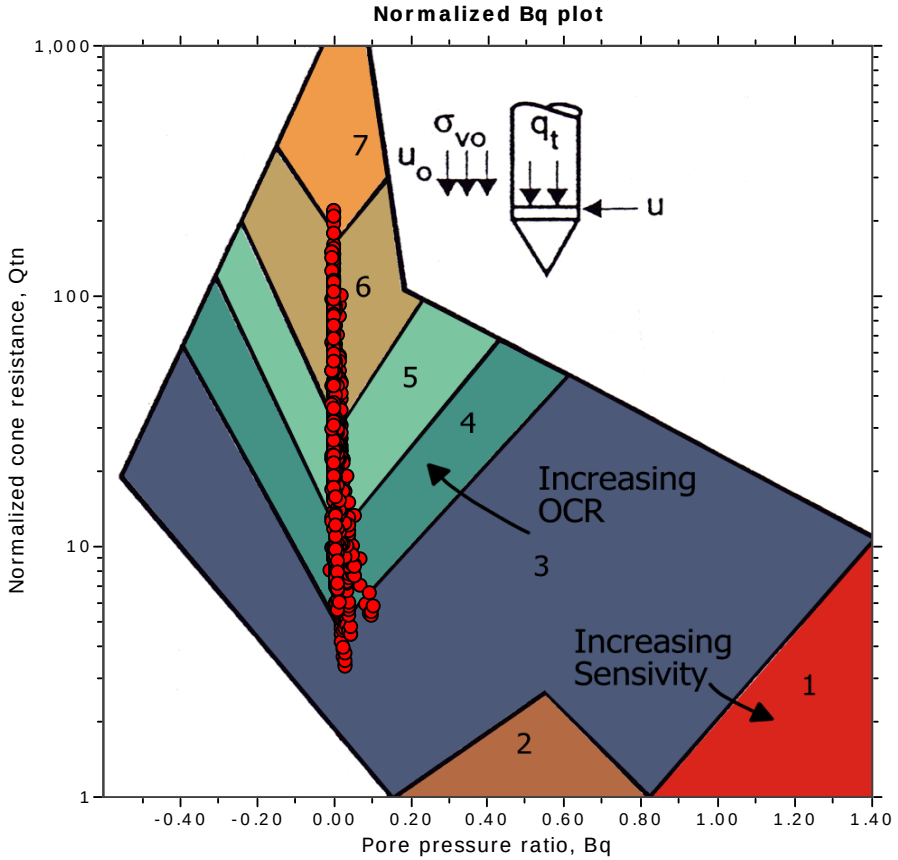
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0246CPT
Total depth: 100.23 ft
Surface Elevation: 220.64 ft
Coords: X:6442635.00, Y:1801605.91

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0246CPT

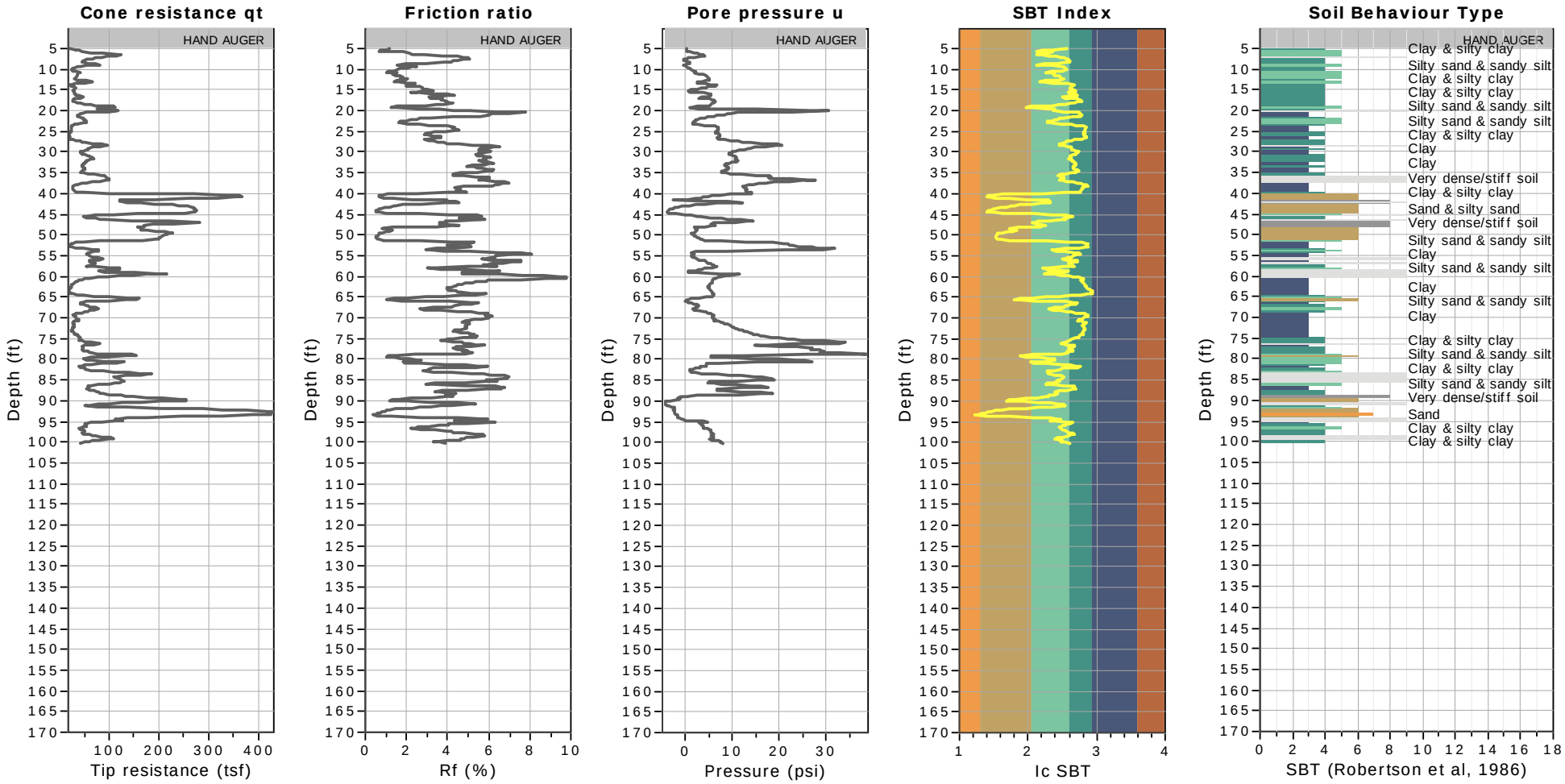
Total depth: 100.23 ft

Surface Elevation: 220.64 ft

Coords: X:6442635.00, Y:1801605.91

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0246CPT

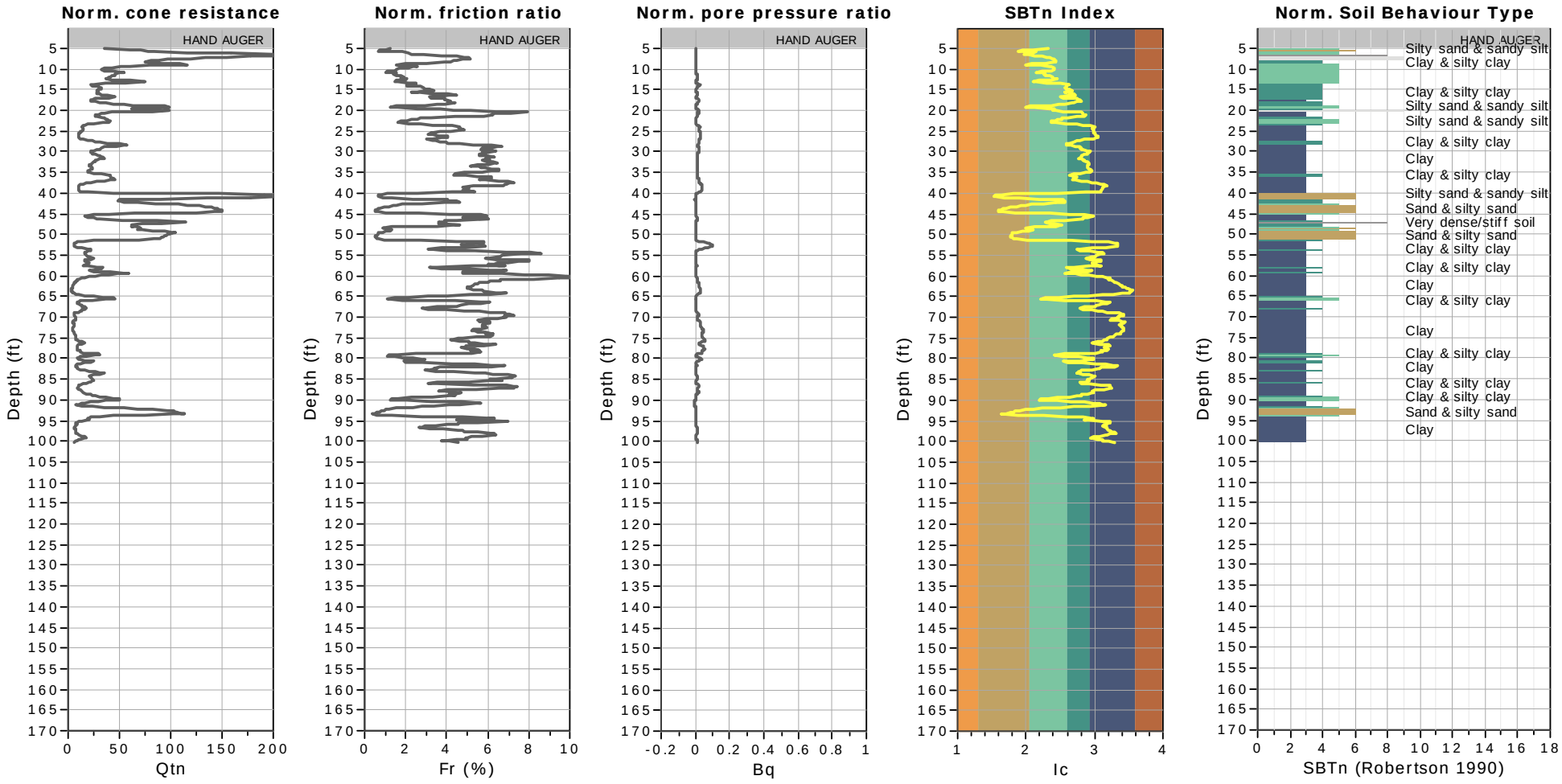
Total depth: 100.23 ft

Surface Elevation: 220.64 ft

Coords: X:6442635.00, Y:1801605.91

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

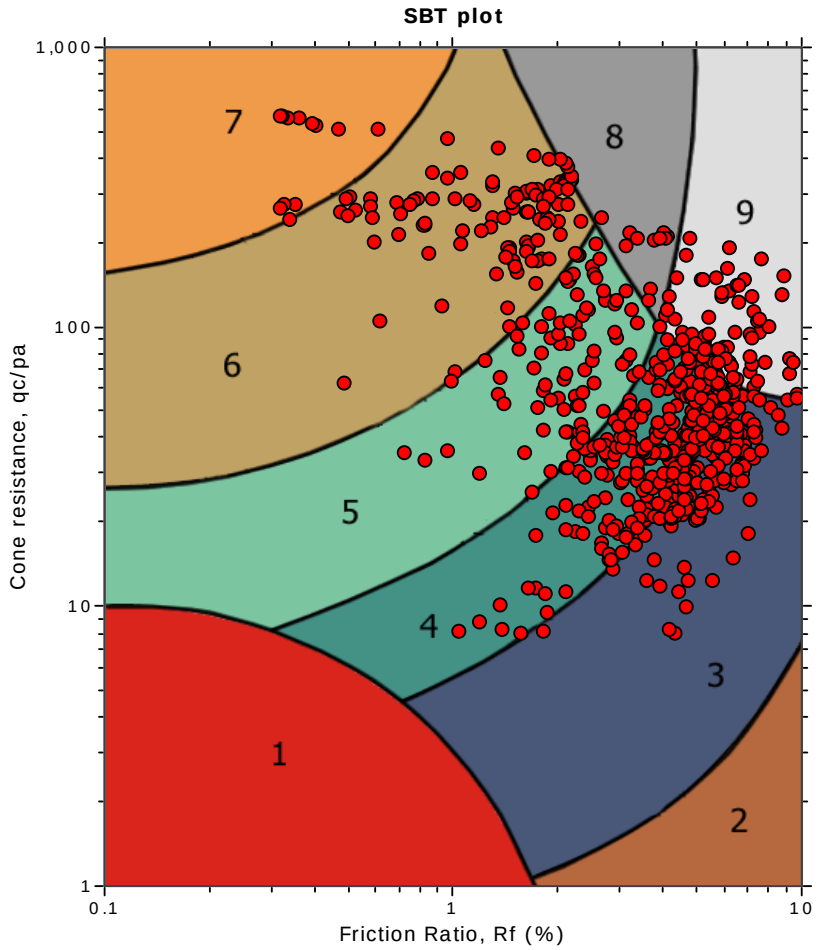
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2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

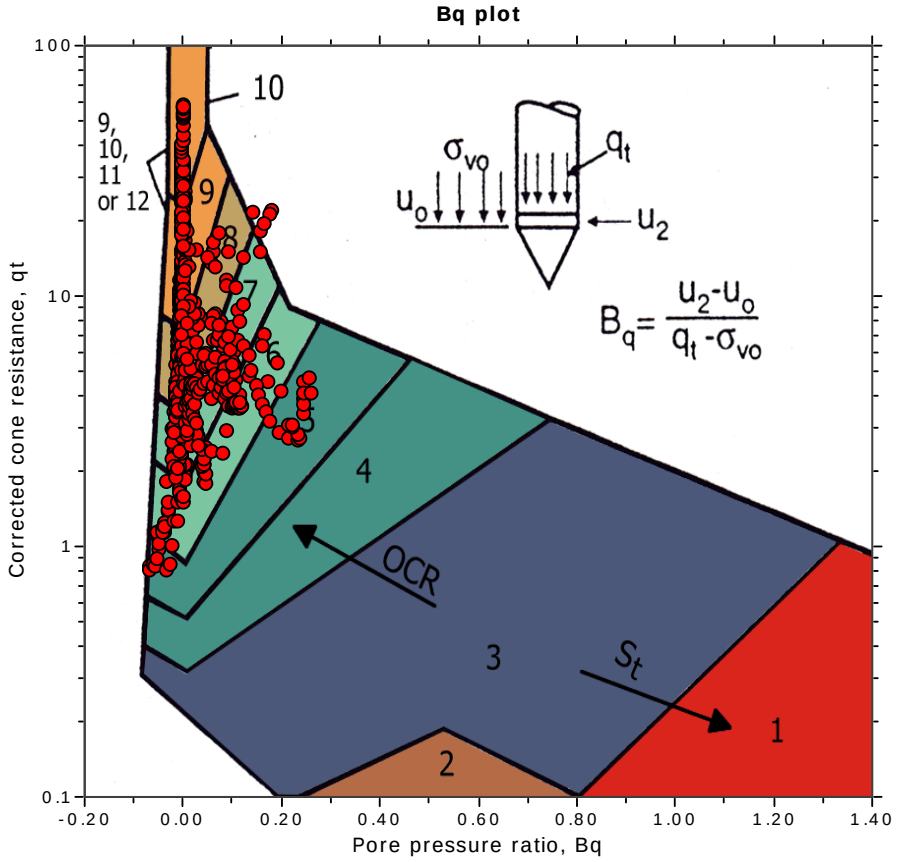
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0248CPT
Total depth: 120.24 ft
Surface Elevation: 229.47 ft
Coords: X:6445424.36, Y:1796396.18

SBT - Bq plots





SBT legend

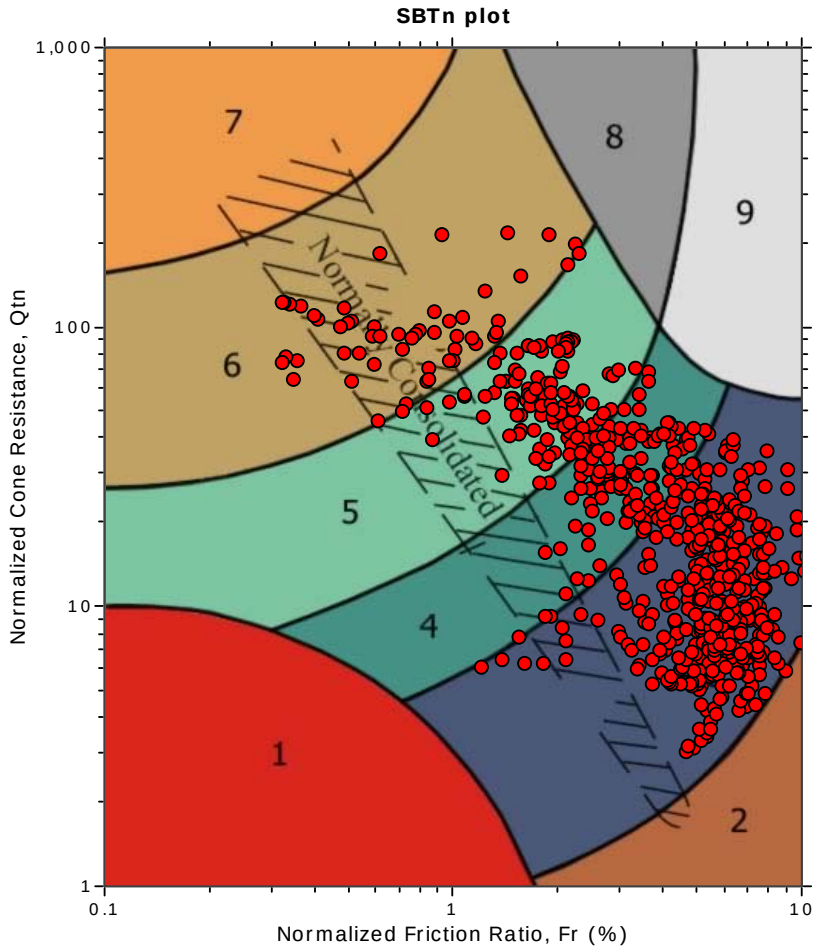
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

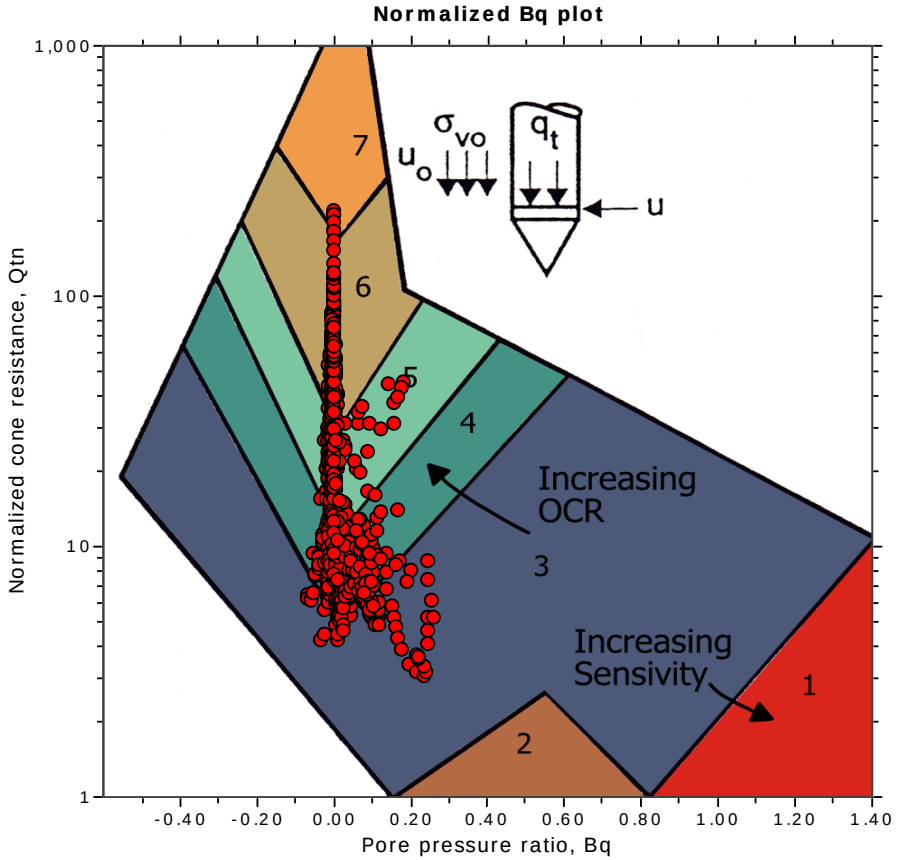
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0248CPT
Total depth: 120.24 ft
Surface Elevation: 229.47 ft
Coords: X:6445424.36, Y:1796396.18

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0248CPT

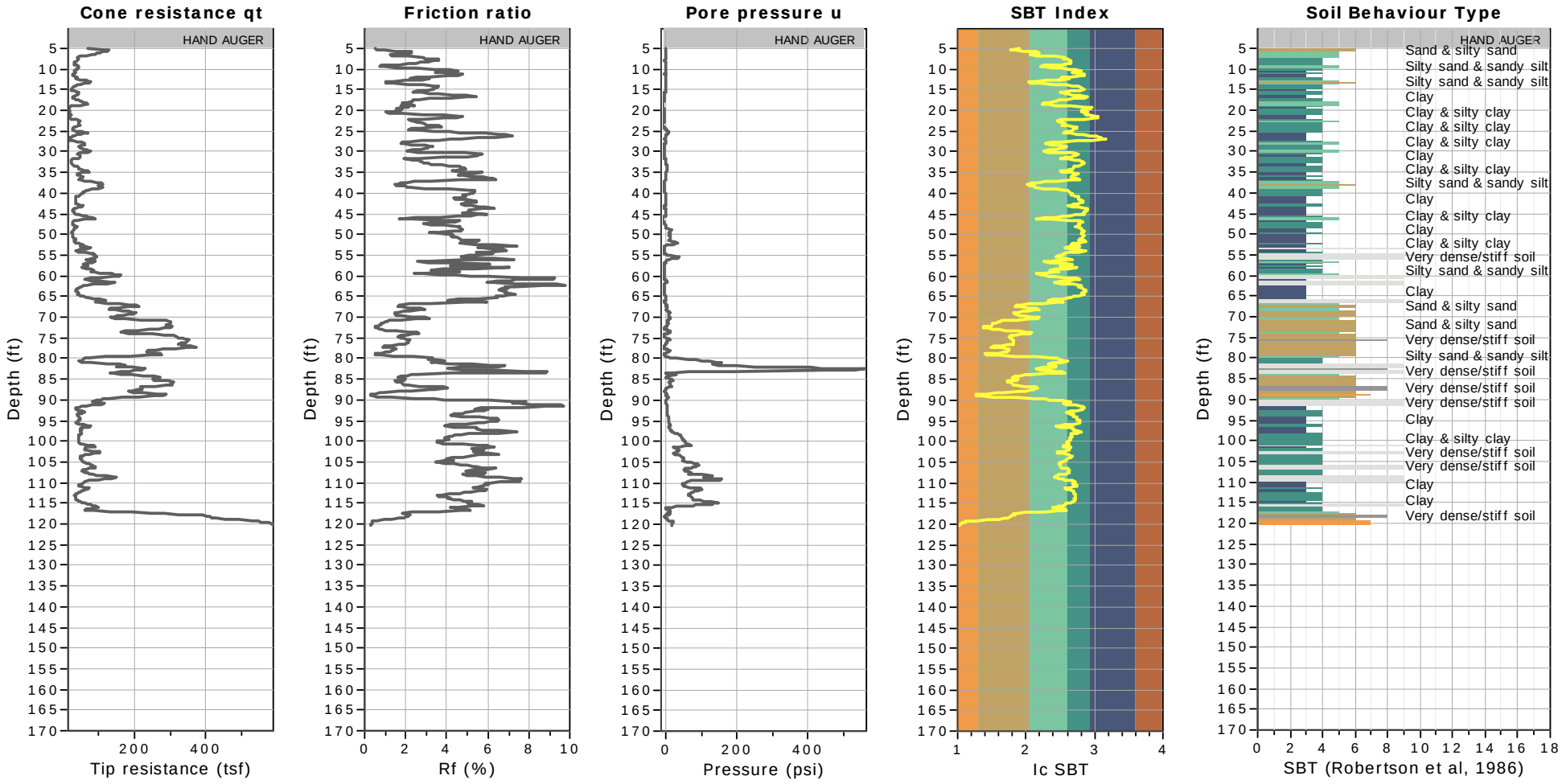
Total depth: 120.24 ft

Surface Elevation: 229.47 ft

Coords: X:6445424.36, Y:1796396.18

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

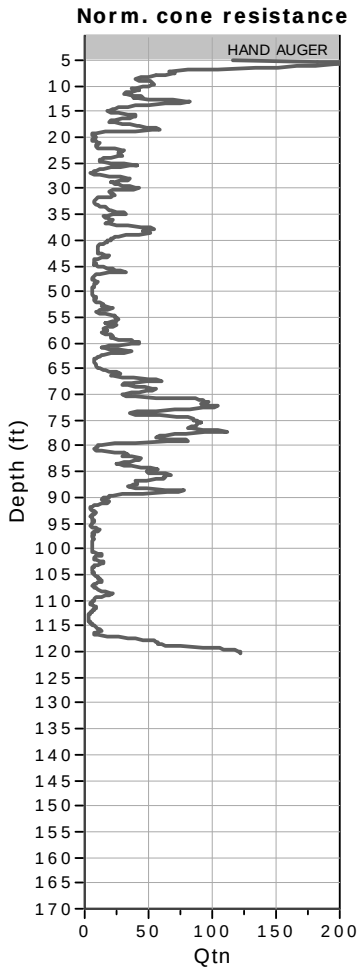
Location: Fresno-Bakersfield

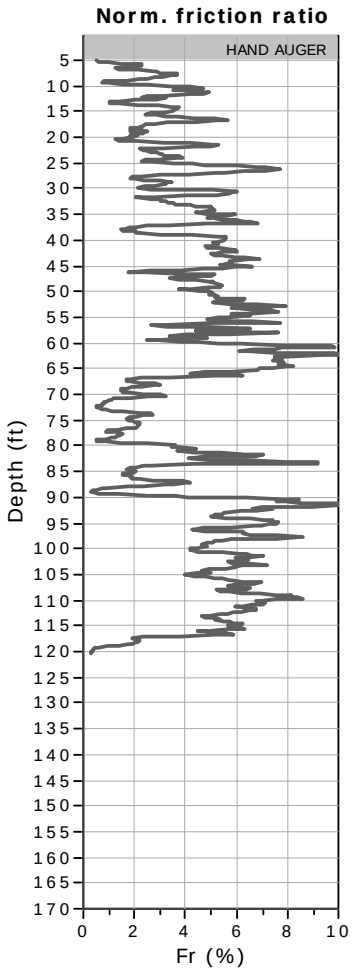
CPT: S0248CPT

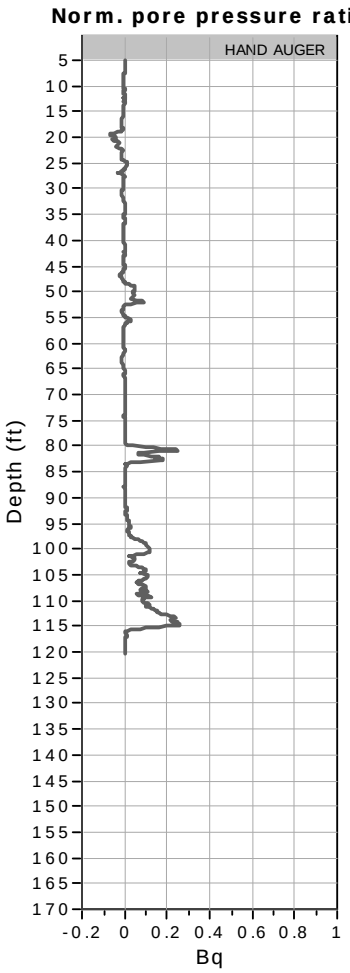
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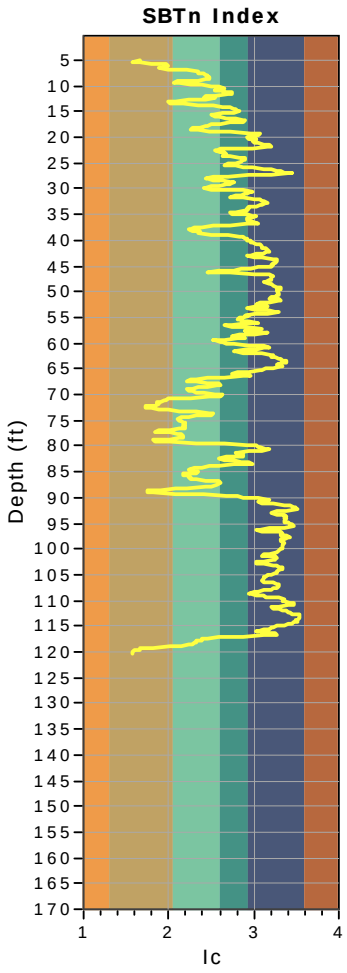
Surface Elevation: 229.47 ft

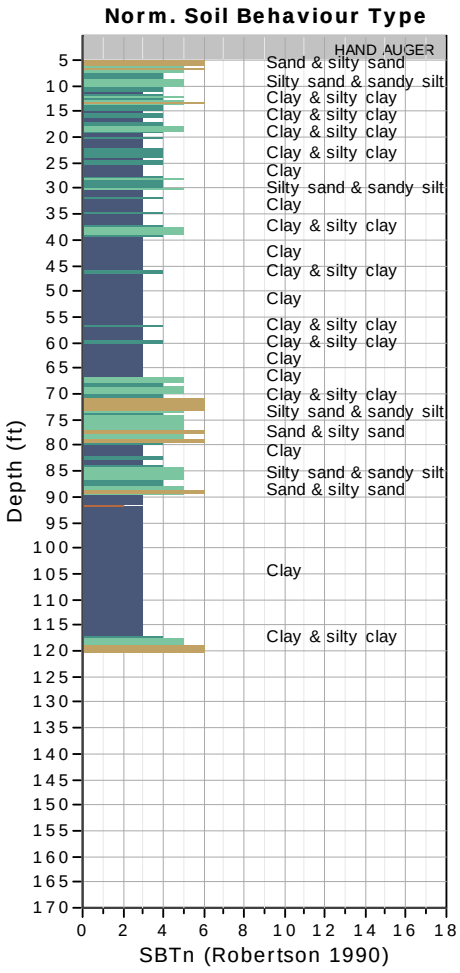
Coords: X:6445424.36, Y:1796396.18











SBTn legend

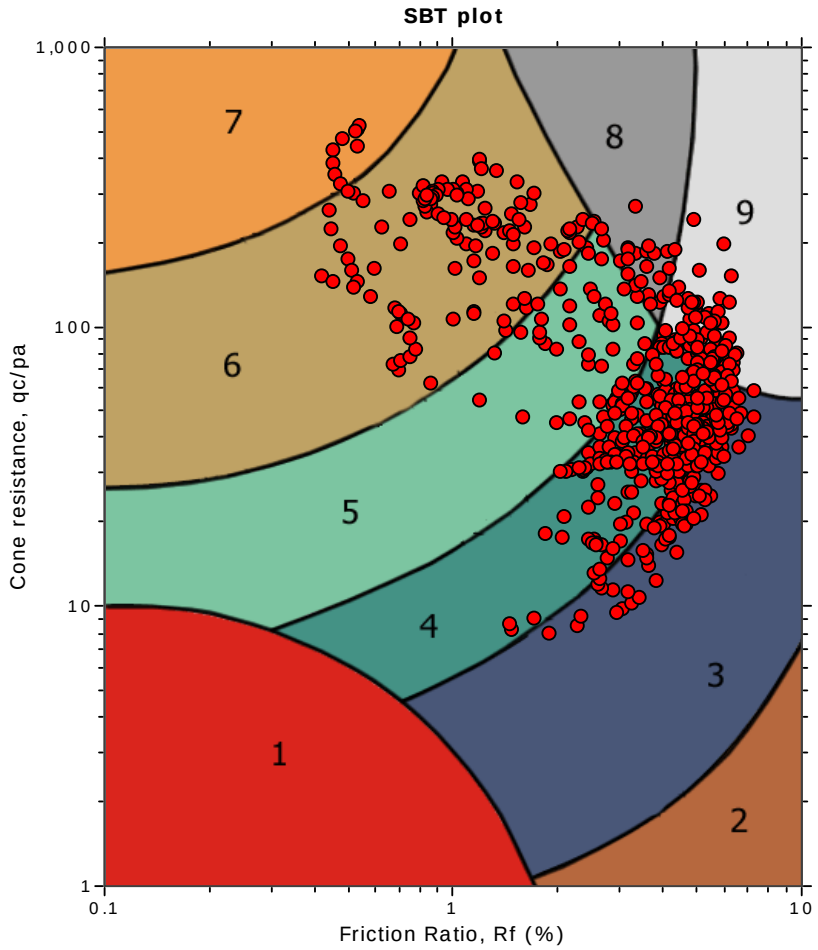
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

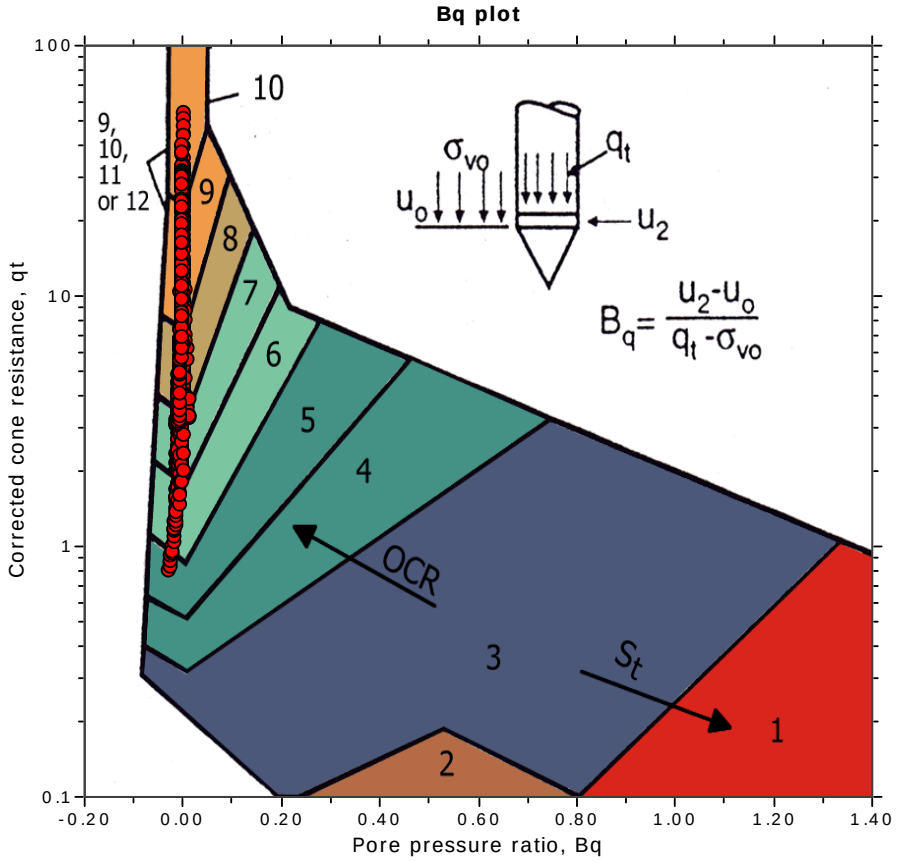
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0249CPT
Total depth: 115.16 ft
Surface Elevation: 227.17 ft
Coords: X:6442754.42, Y:1796383.53

SBT - Bq plots





SBT legend

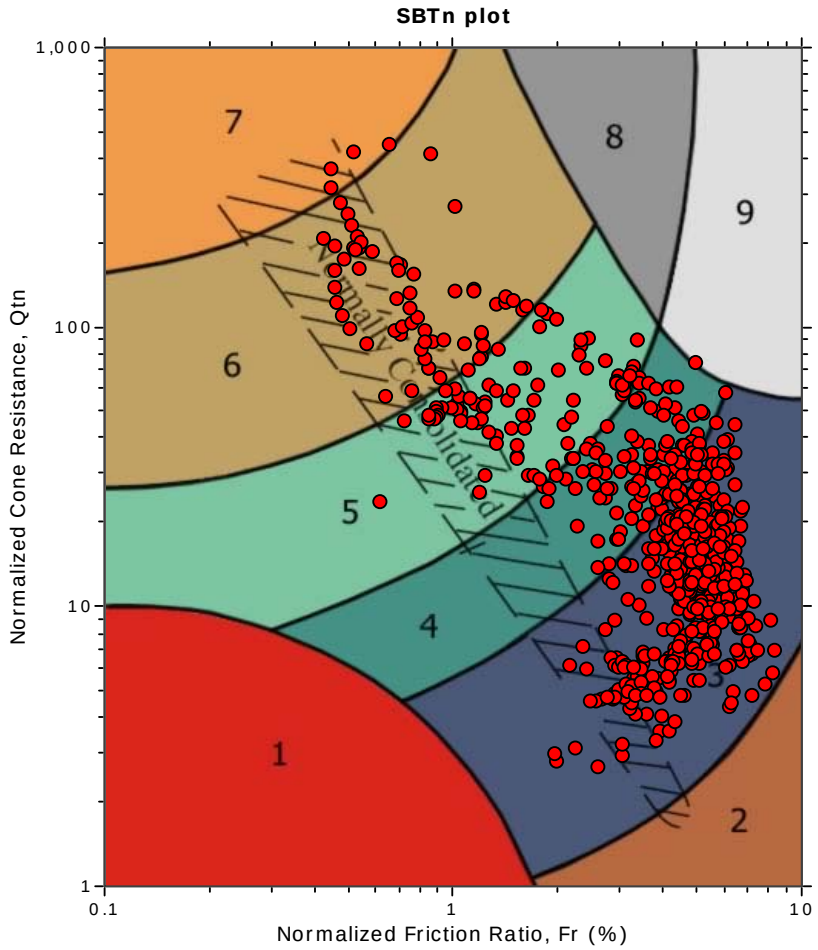
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

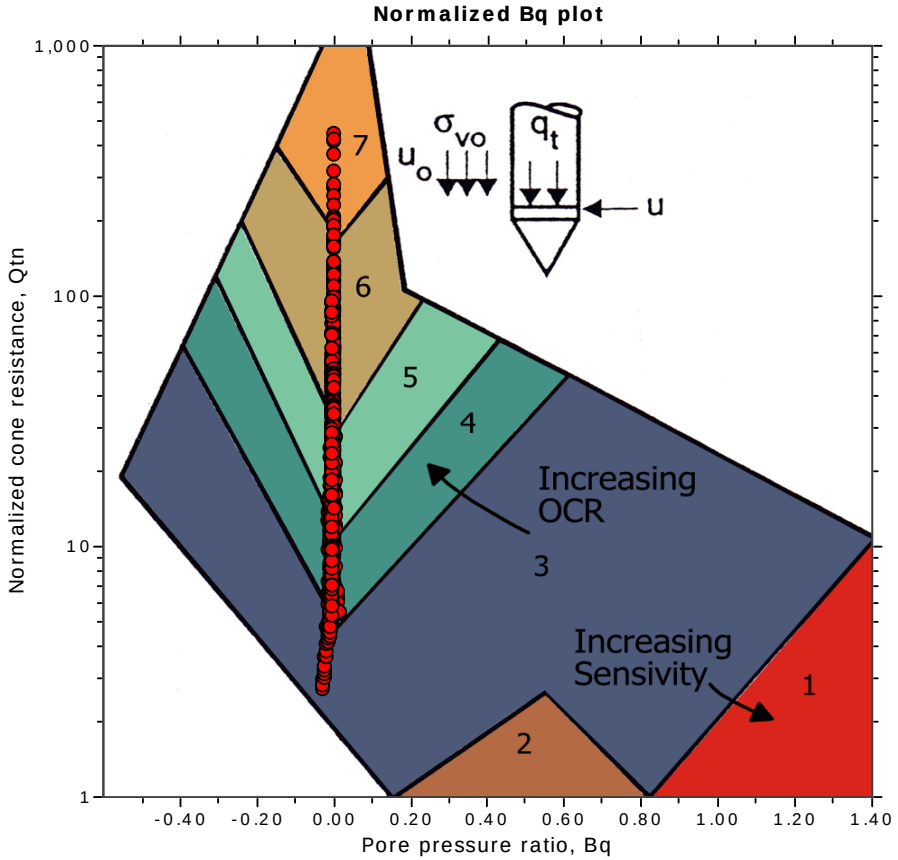
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0249CPT
Total depth: 115.16 ft
Surface Elevation: 227.17 ft
Coords: X:6442754.42, Y:1796383.53

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0249CPT

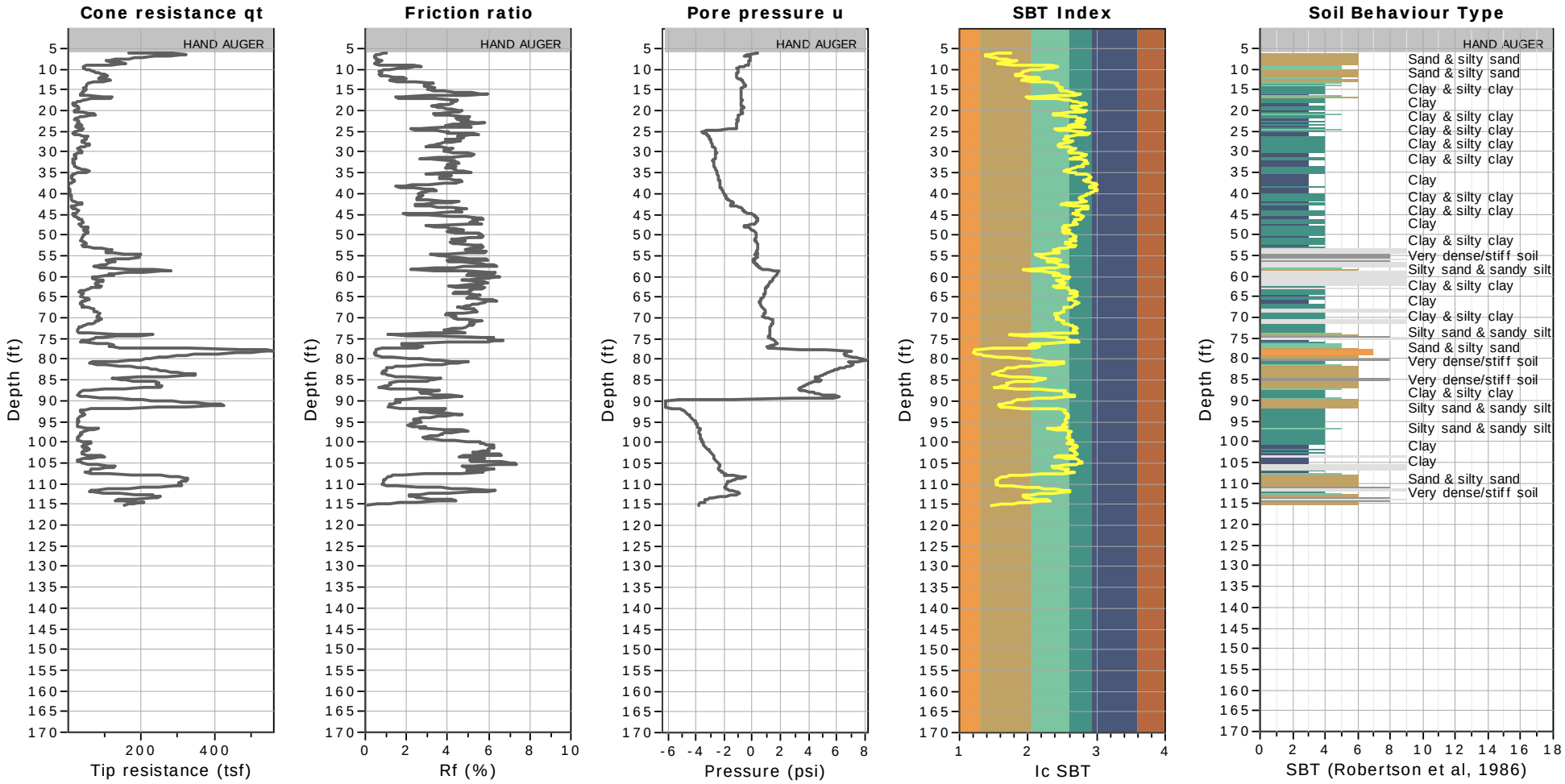
Total depth: 115.16 ft

Surface Elevation: 227.17 ft

Coords: X:6442754.42, Y:1796383.53

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0249CPT

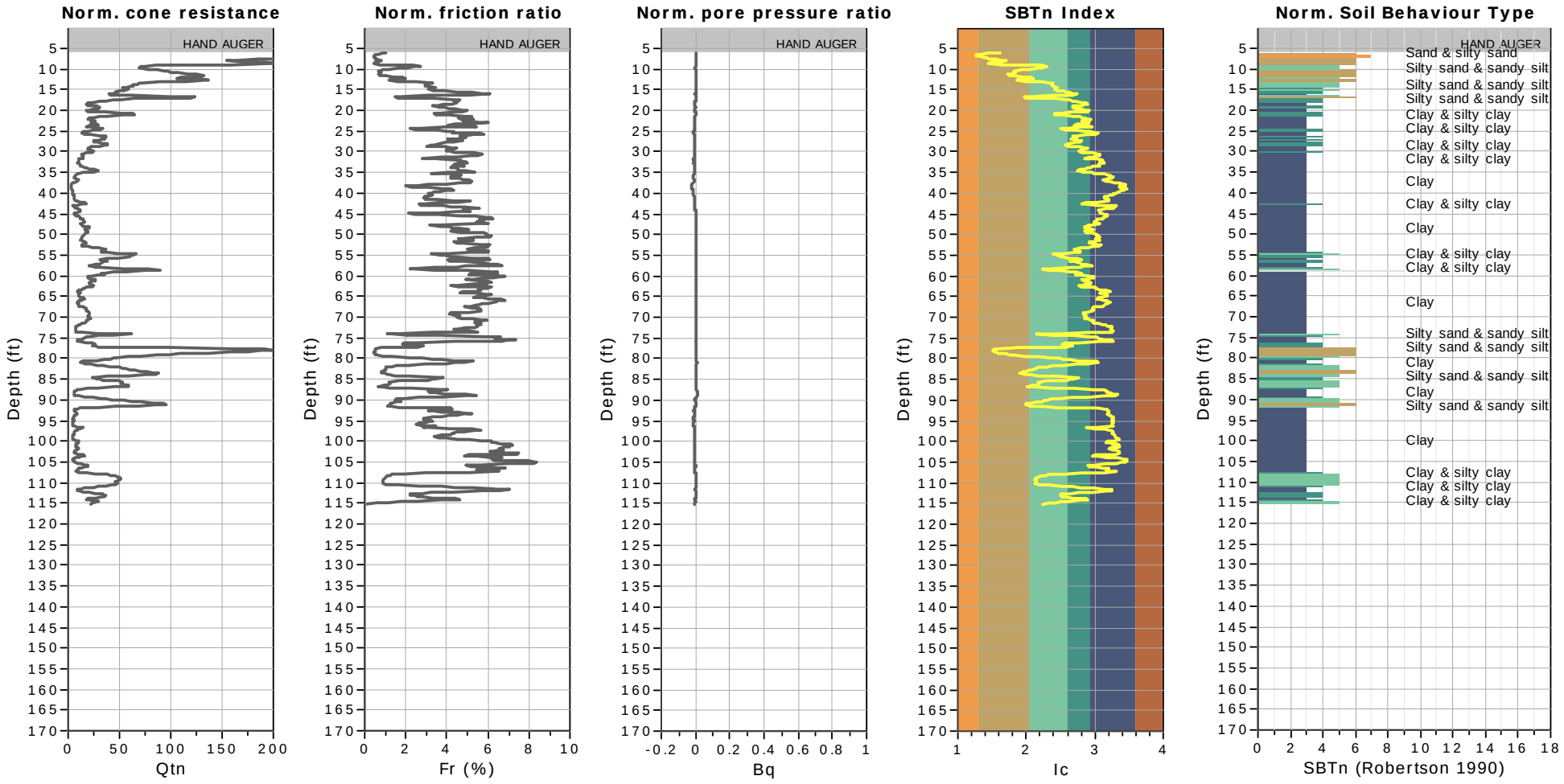
Total depth: 115.16 ft

Surface Elevation: 227.17 ft

Coords: X:6442754.42, Y:1796383.53

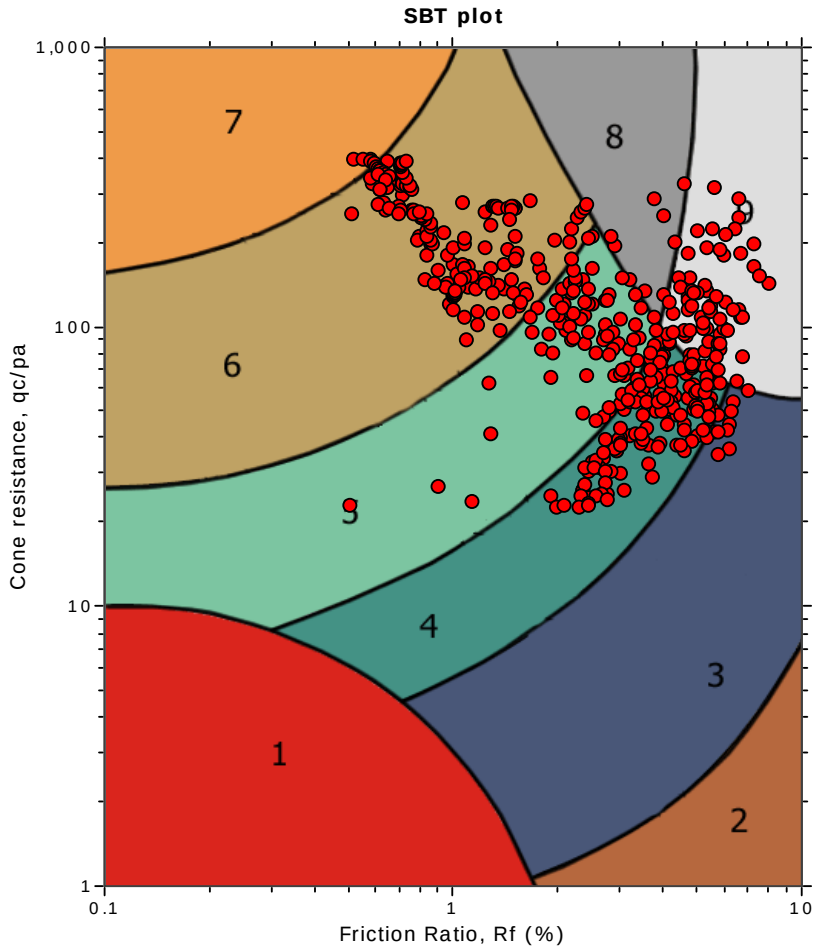
Project: California High-Speed Train

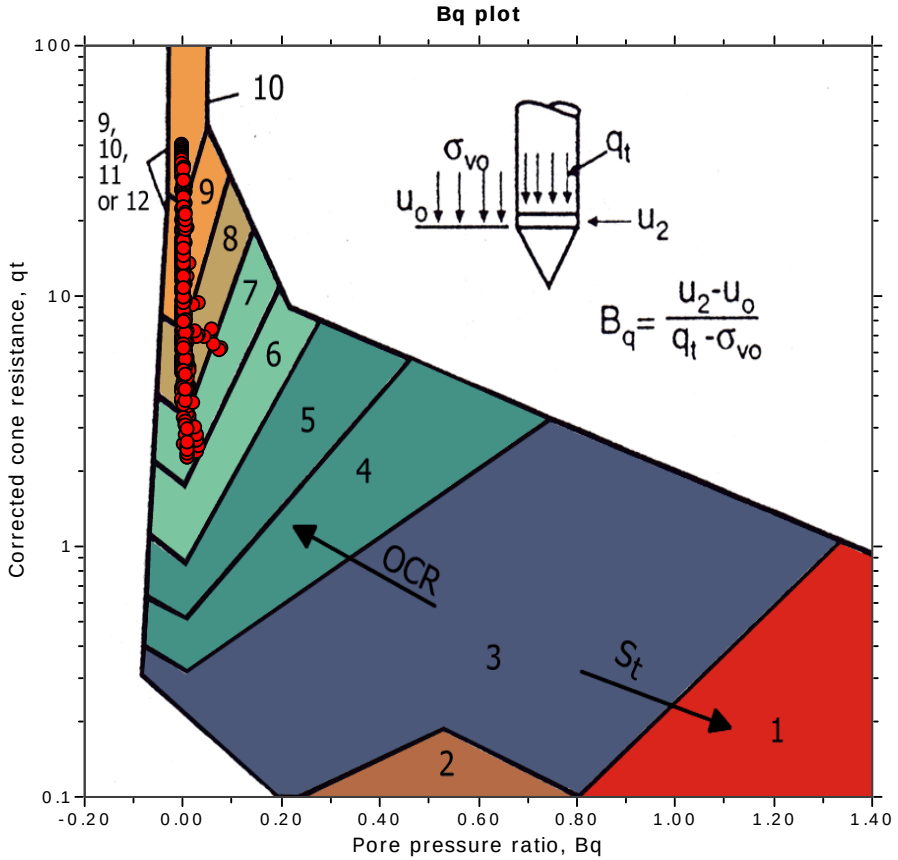
Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



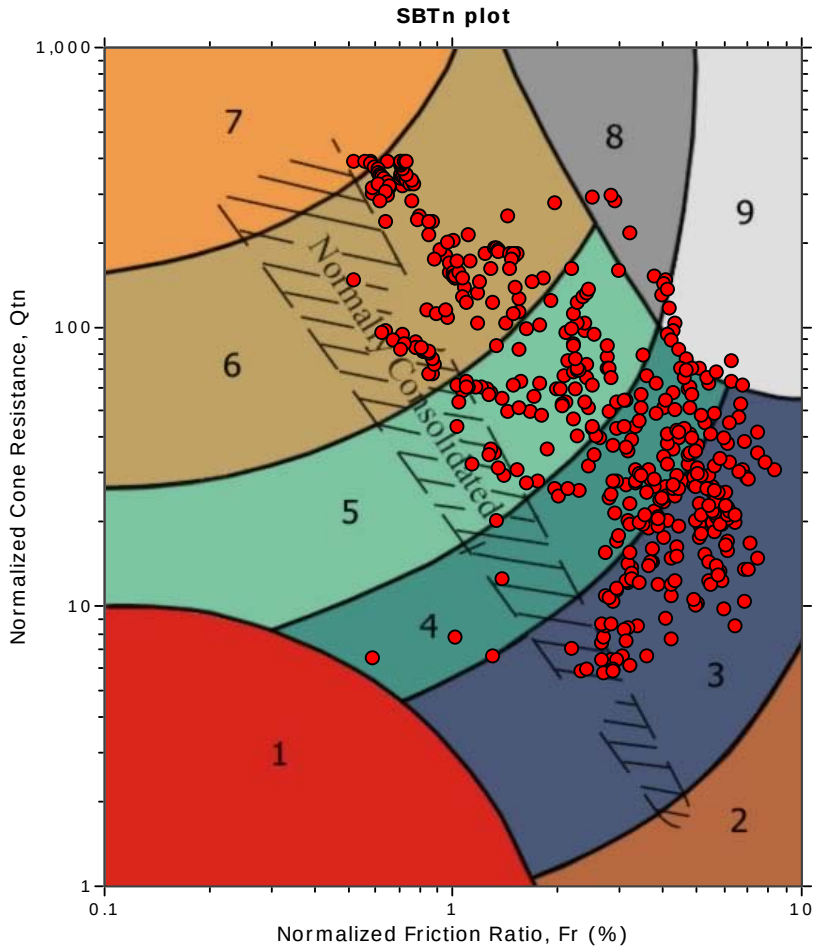


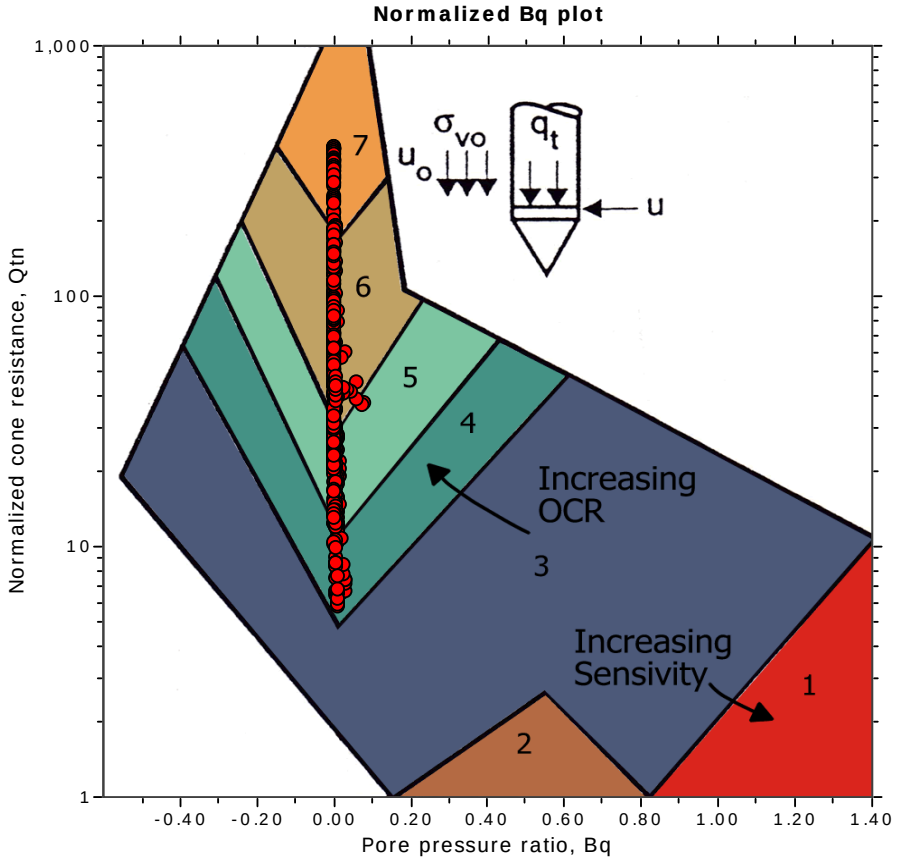
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

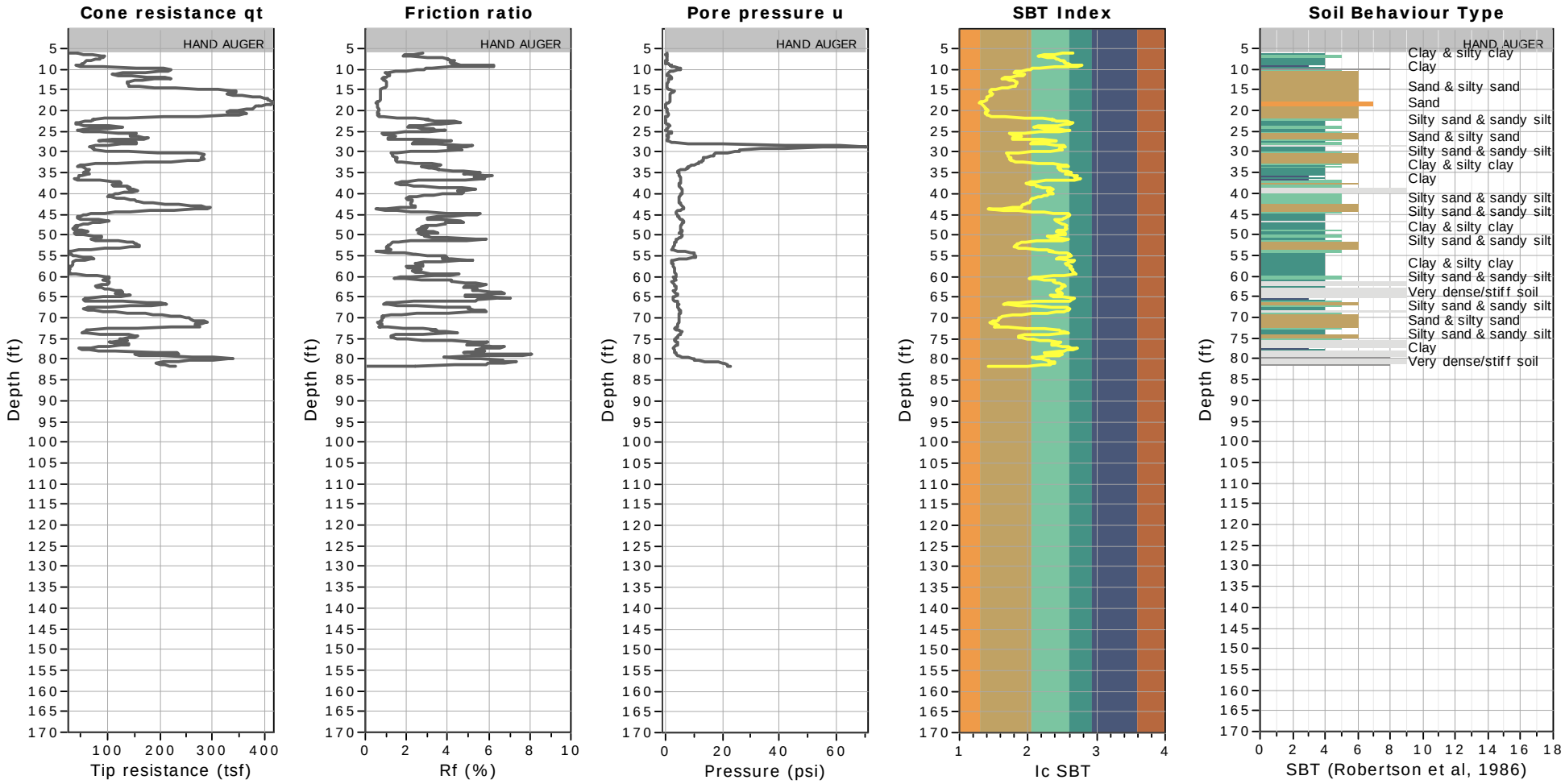
Location: Fresno-Bakersfield

CPT: S0252CPT

Total depth: 81.69 ft

Surface Elevation: 245.33 ft

Coords: X:6453057.55, Y:1785825.11



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0252CPT

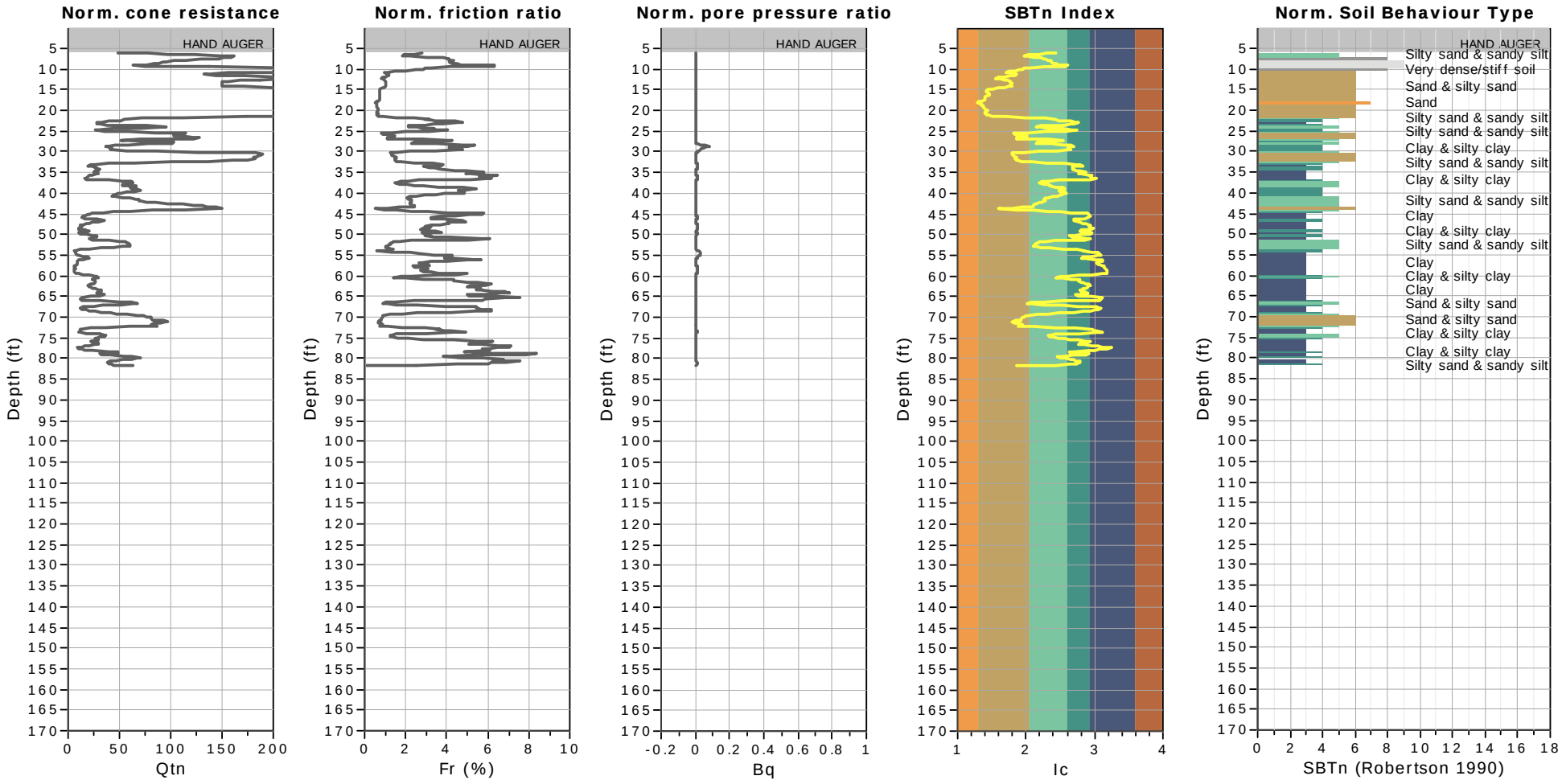
Total depth: 81.69 ft

Surface Elevation: 245.33 ft

Coords: X:6453057.55, Y:1785825.11

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

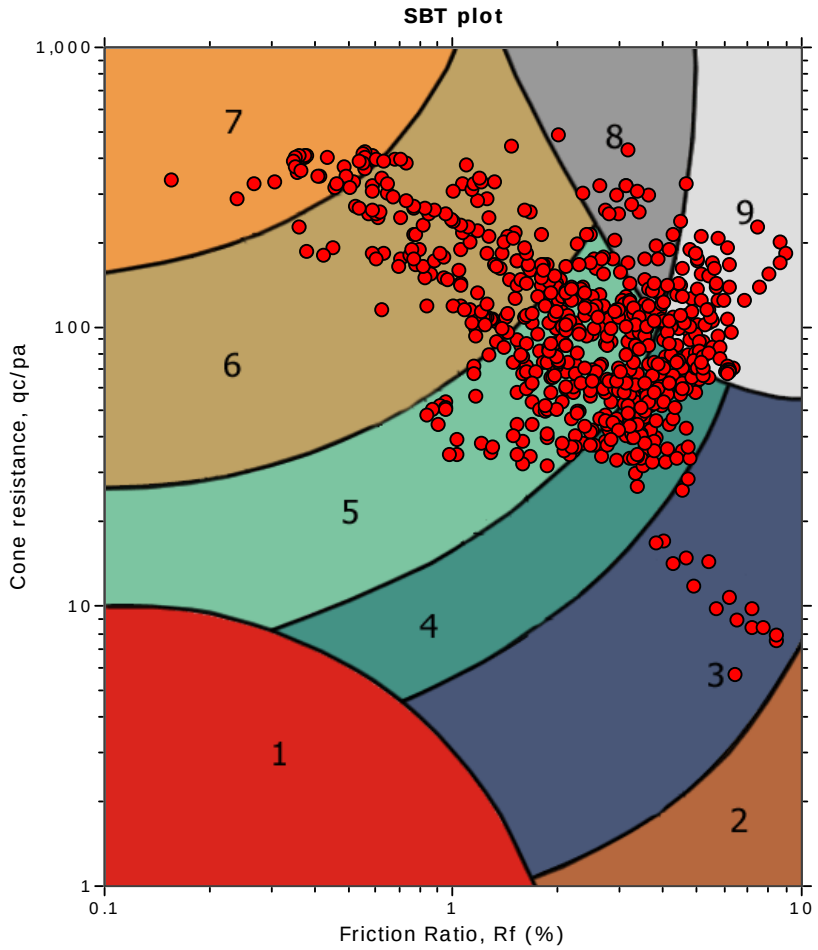
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

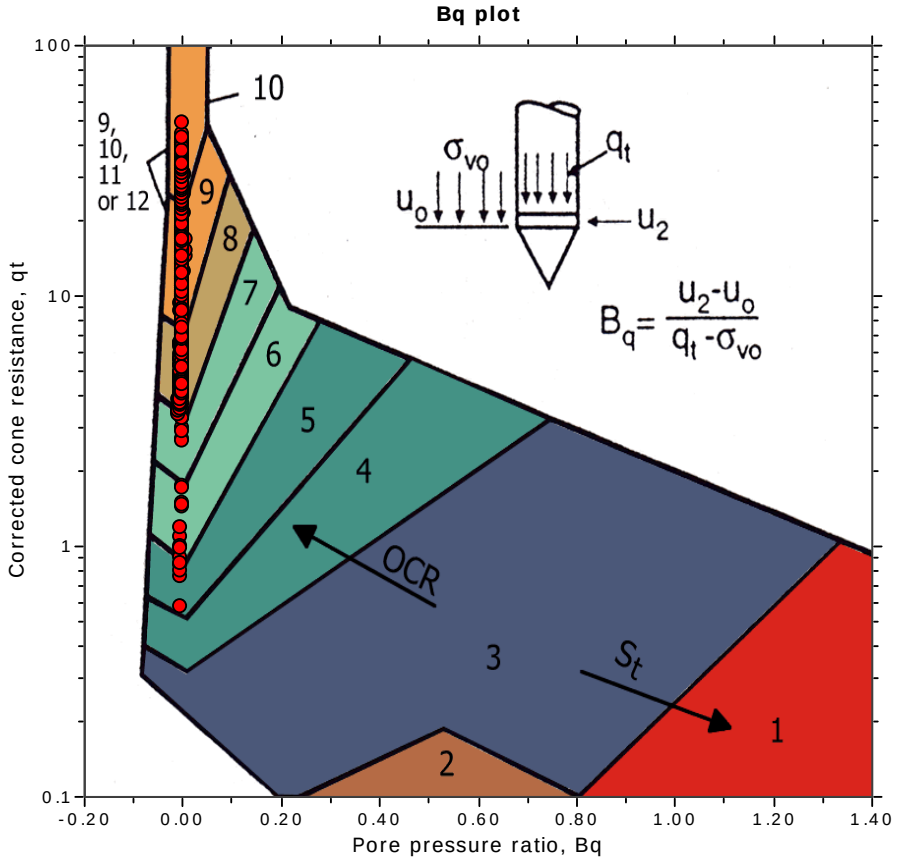
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0254CPT
Total depth: 115.32 ft
Surface Elevation: 257.87 ft
Coords: X:6454414.98, Y:1780546.02

SBT - Bq plots



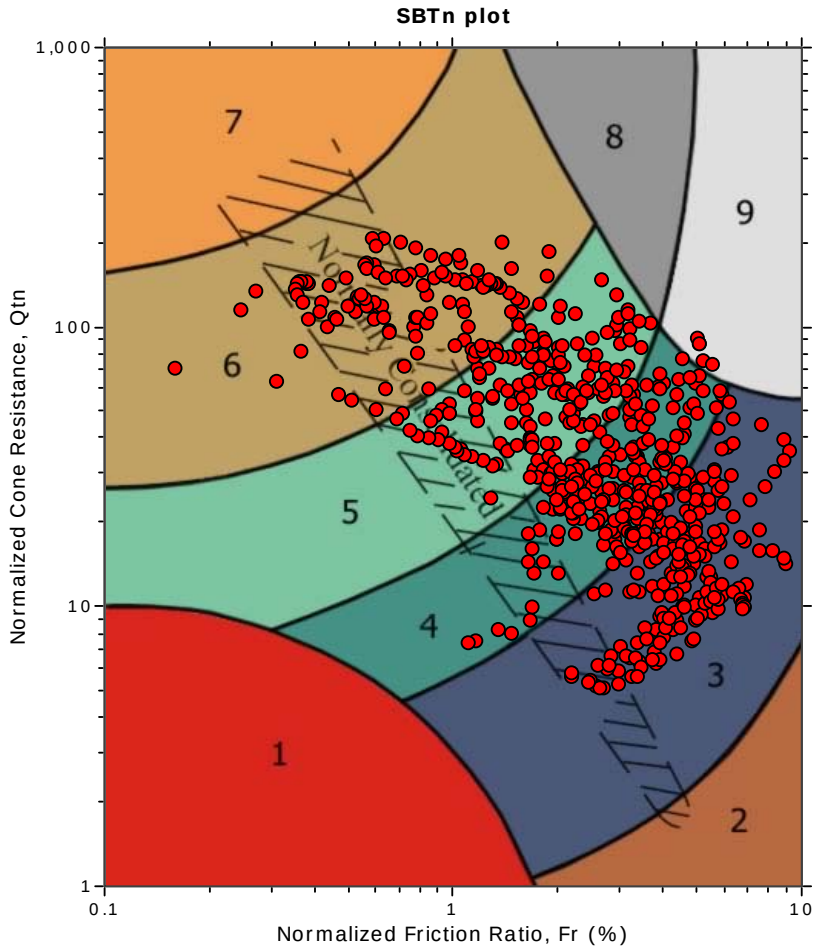


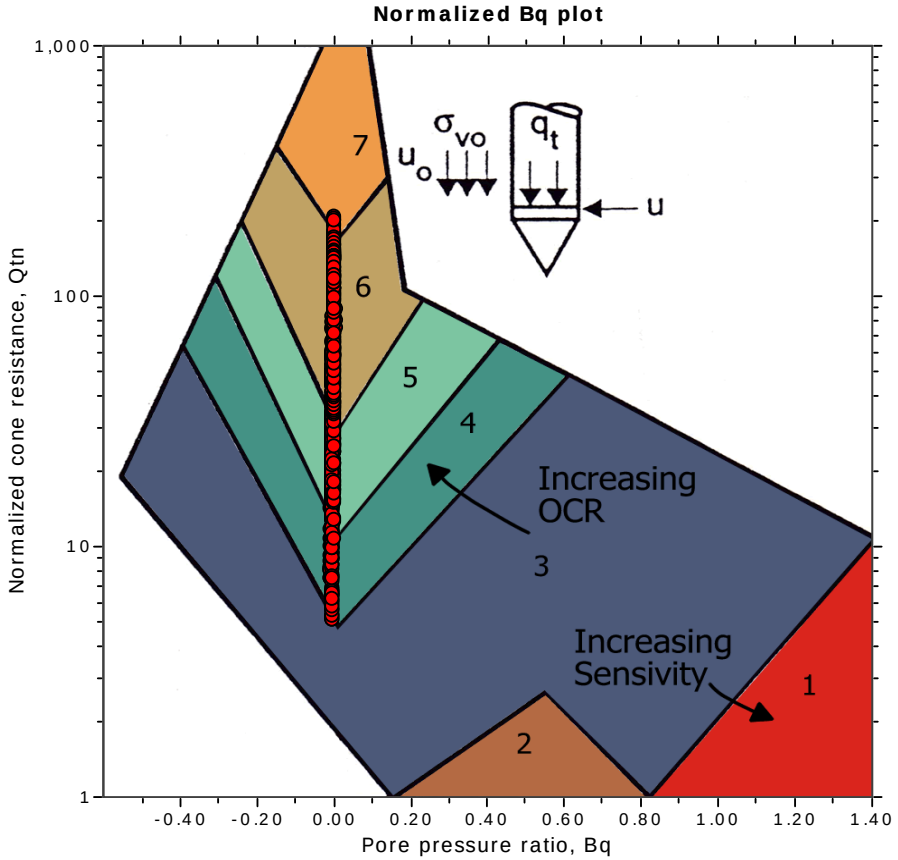
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0254CPT

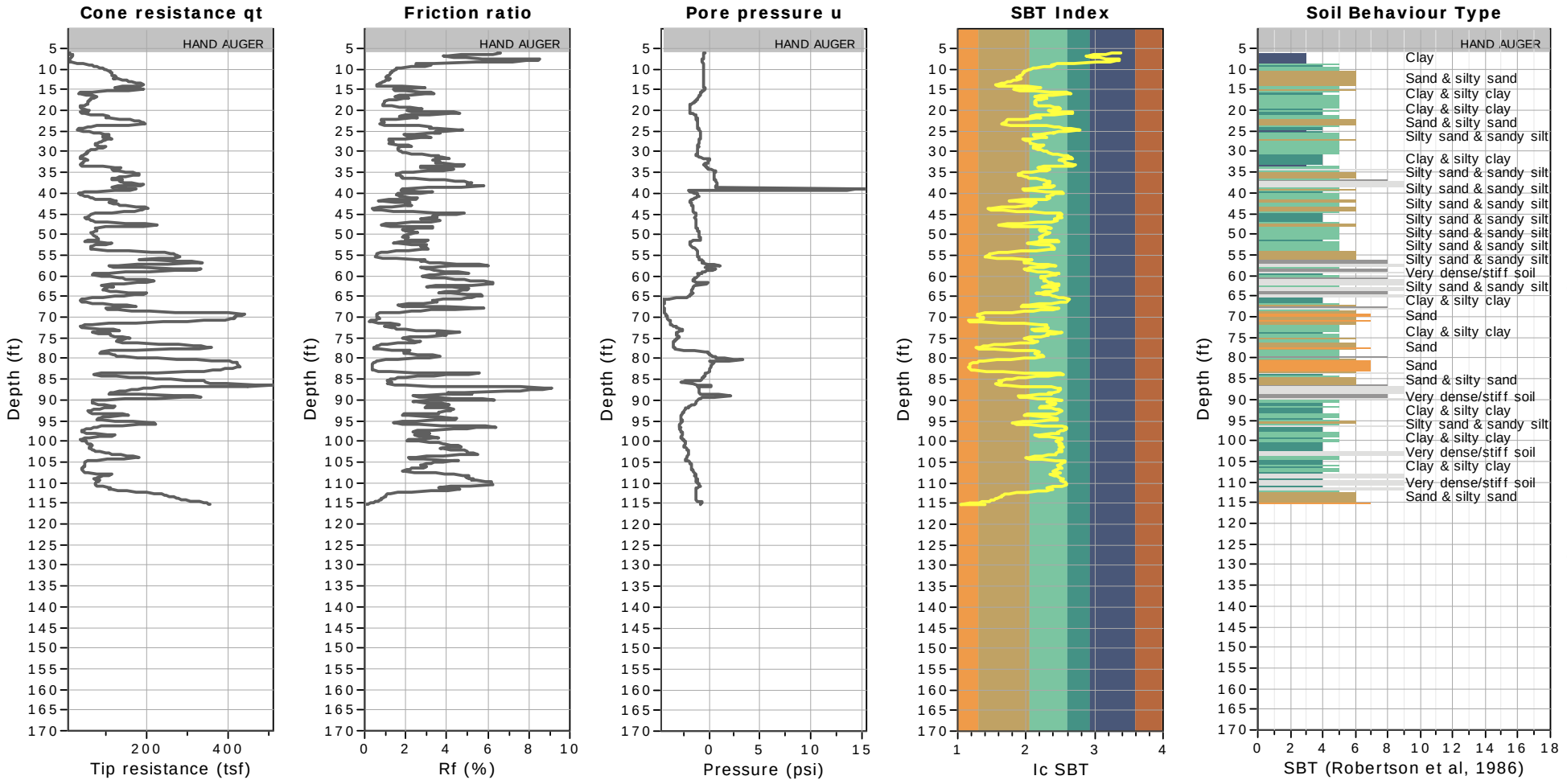
Total depth: 115.32 ft

Surface Elevation: 257.87 ft

Coords: X:6454414.98, Y:1780546.02

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0254CPT

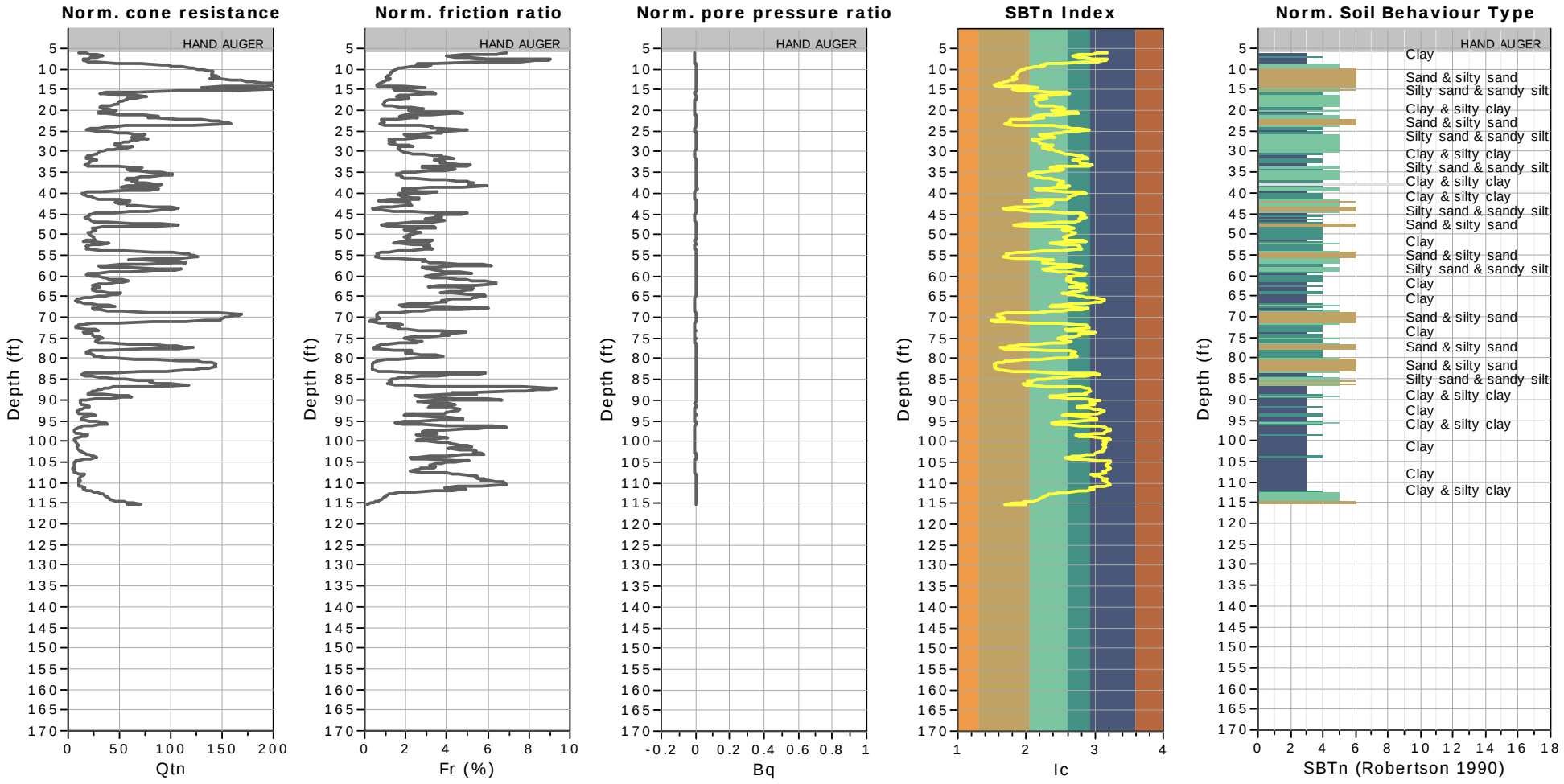
Total depth: 115.32 ft

Surface Elevation: 257.87 ft

Coords: X:6454414.98, Y:1780546.02

Project: California High-Speed Train

Location: Fresno-Bakersfield

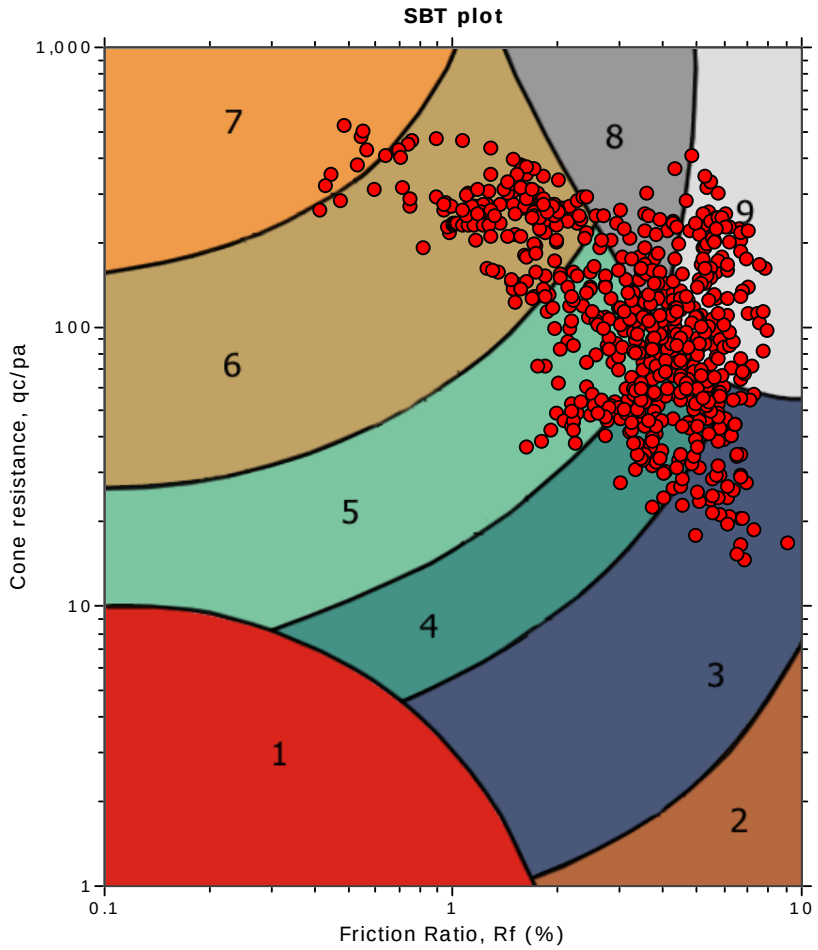


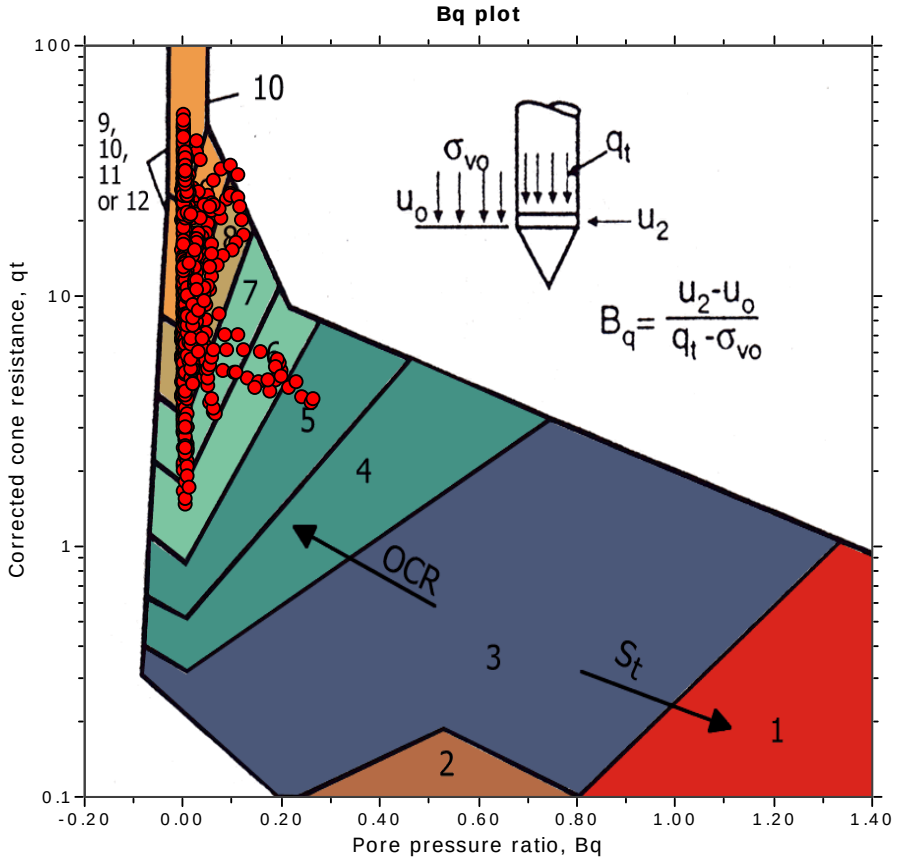
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0257CPT
Total depth: 115.81 ft
Surface Elevation: 269.97 ft
Coords: X:6457991.65, Y:1775265.39

SBT - Bq plots





SBT legend

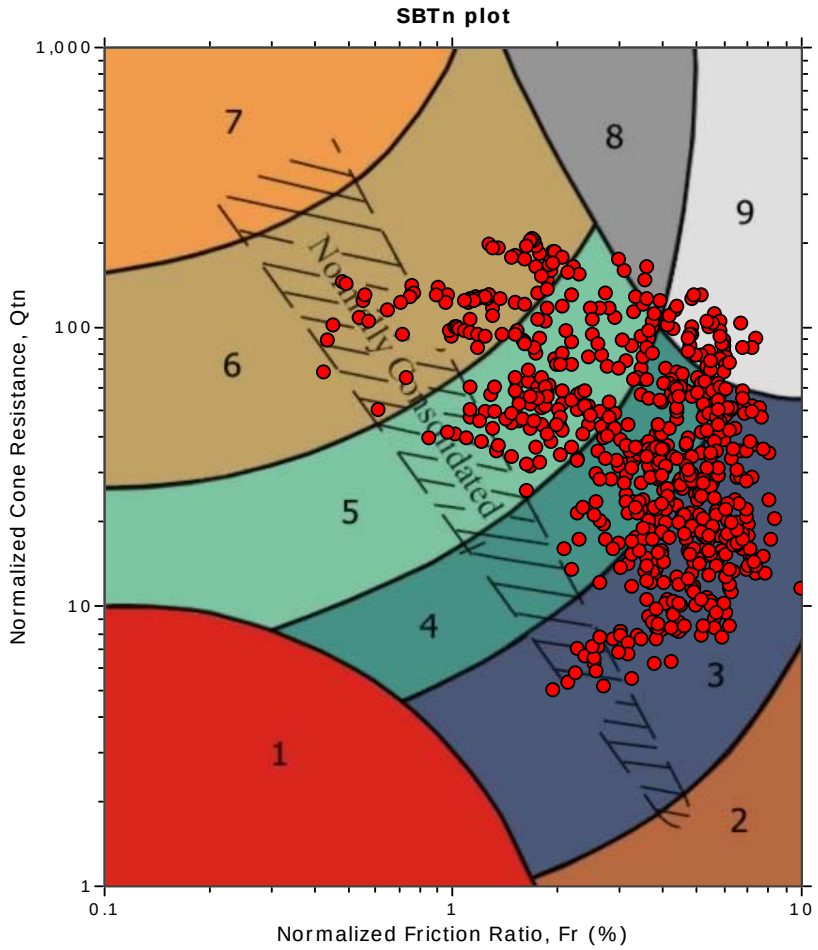
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

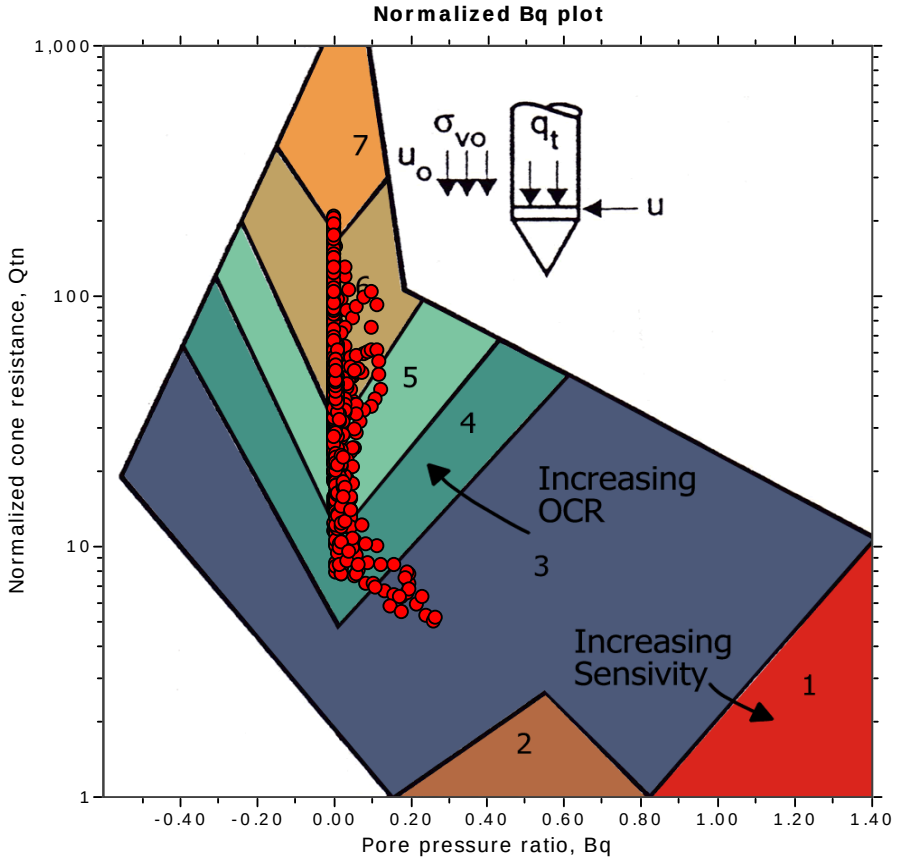
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0257CPT
Total depth: 115.81 ft
Surface Elevation: 269.97 ft
Coords: X:6457991.65, Y:1775265.39

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0257CPT

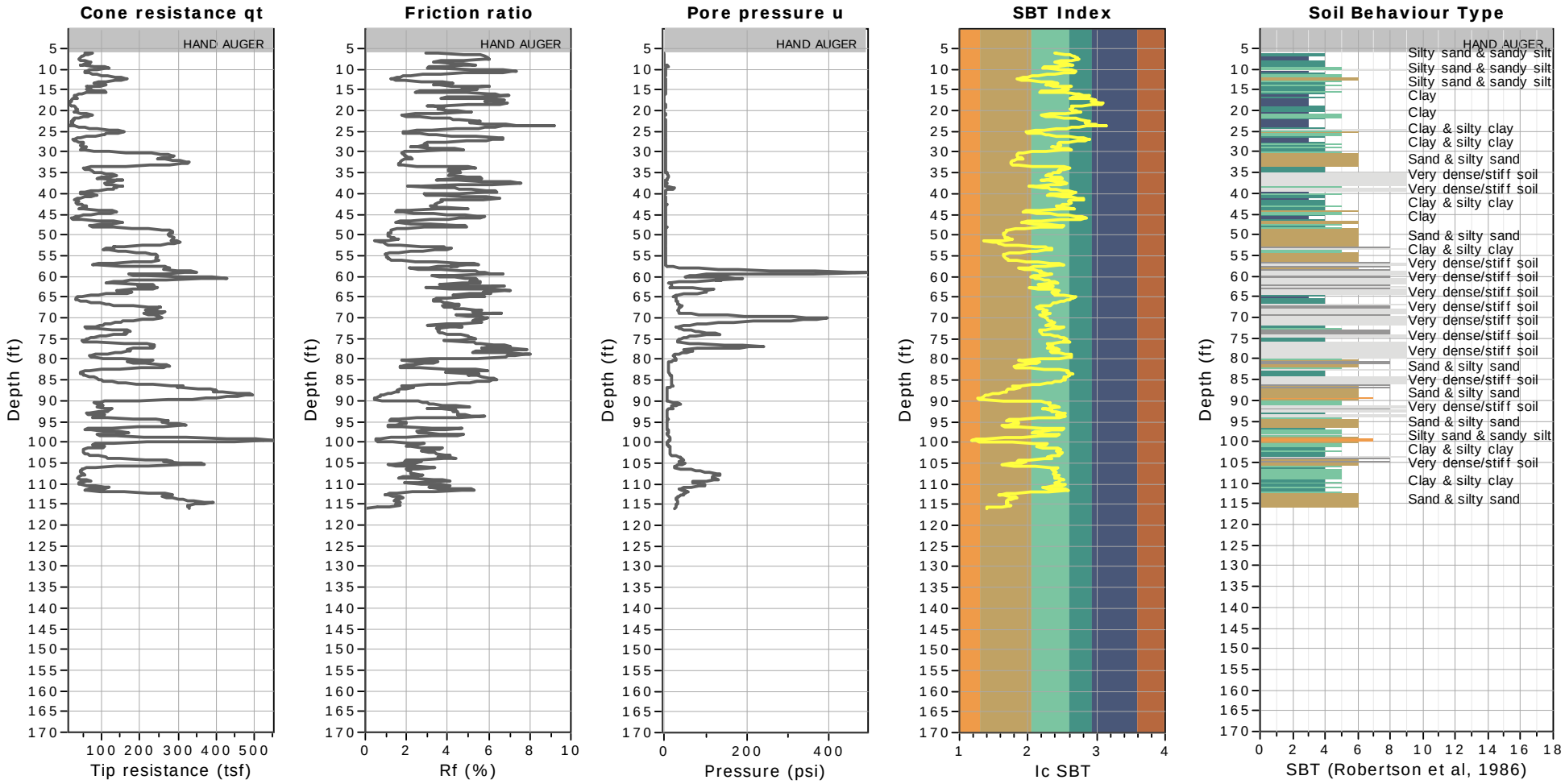
Total depth: 115.81 ft

Surface Elevation: 269.97 ft

Coords: X:6457991.65, Y:1775265.39

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0257CPT

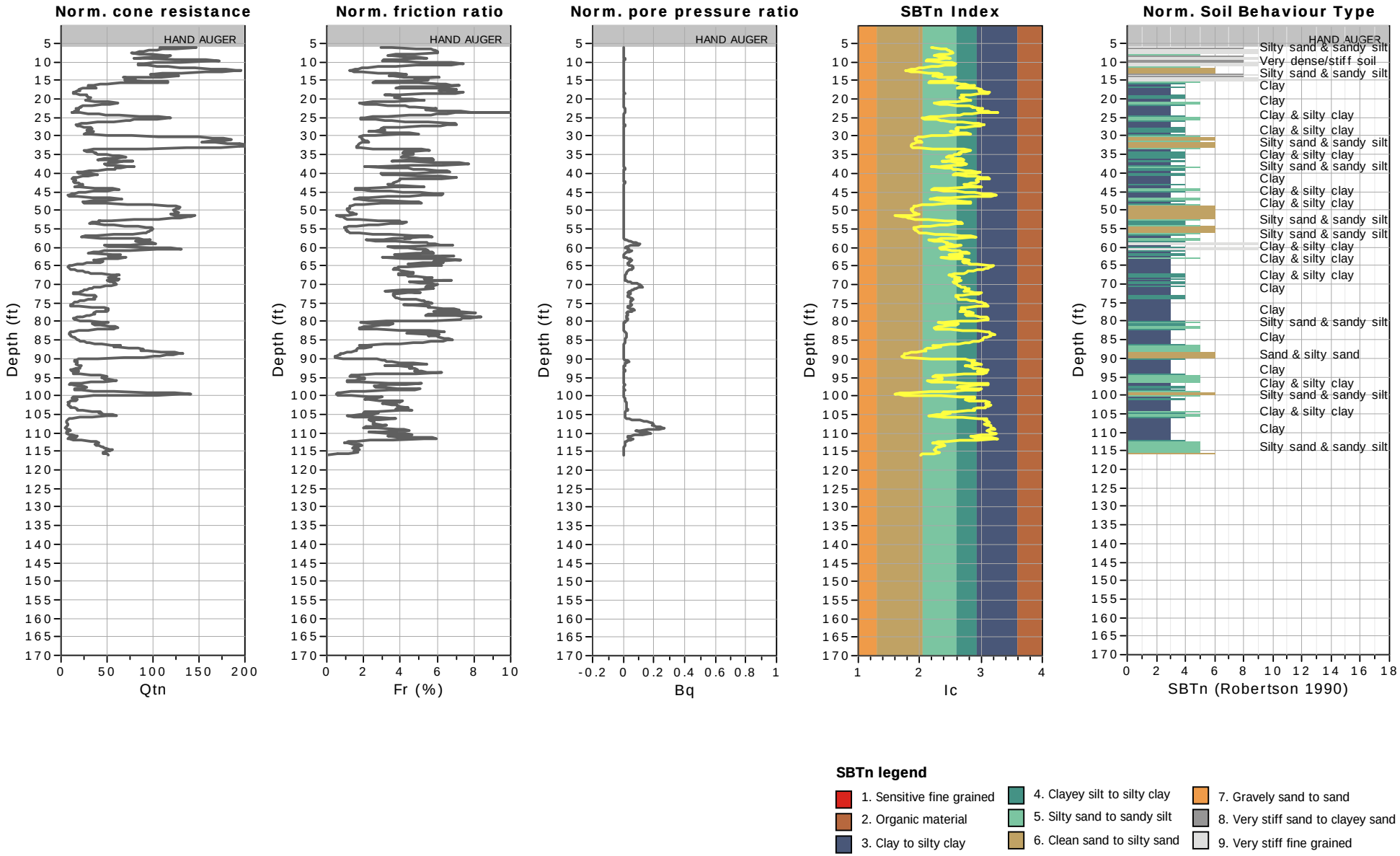
Total depth: 115.81 ft

Surface Elevation: 269.97 ft

Coords: X:6457991.65, Y:1775265.39

Project: California High-Speed Train

Location: Fresno-Bakersfield

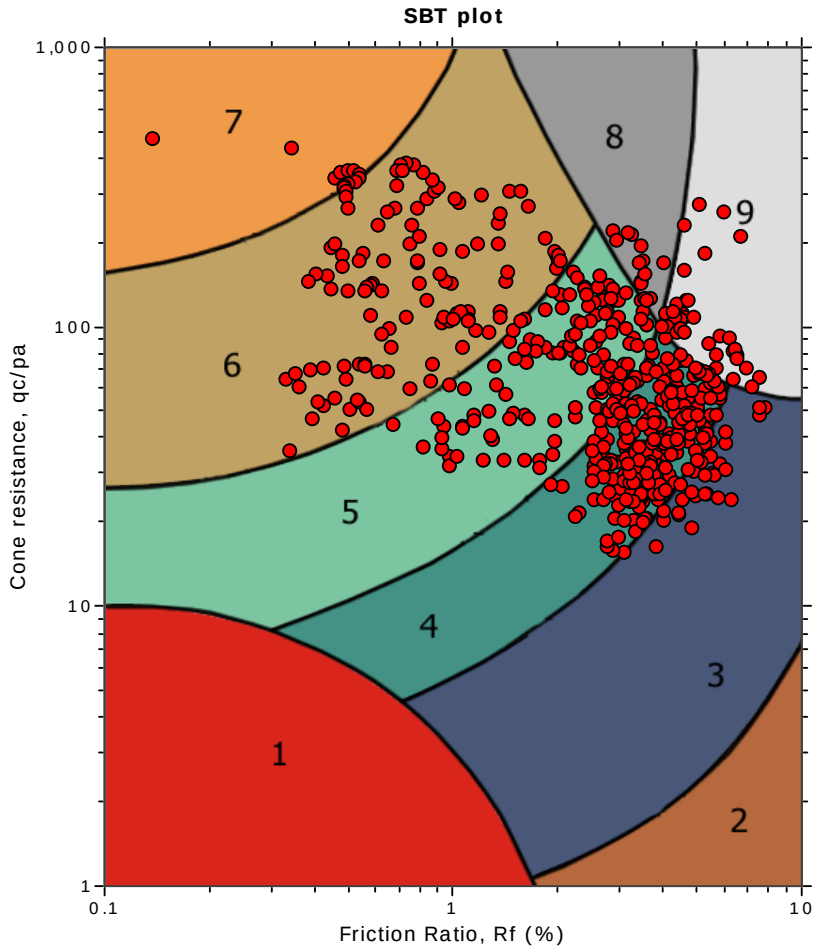


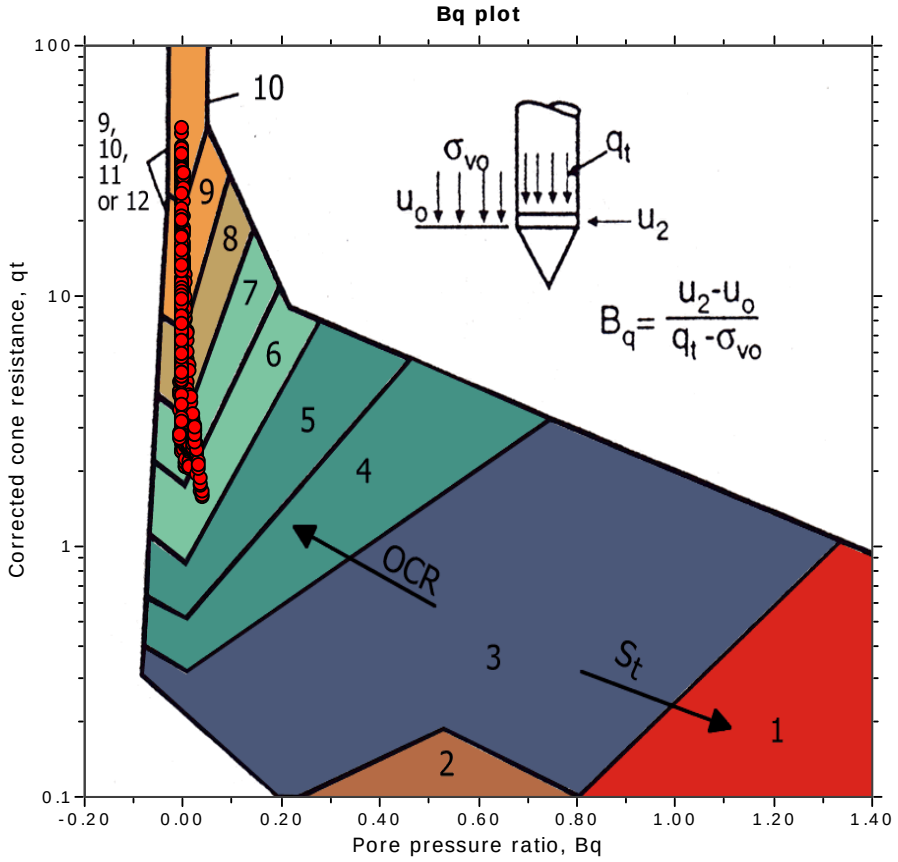
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0260ACPT
Total depth: 100.07 ft
Surface Elevation: 277.88 ft
Coords: X:6463638.58, Y:1769922.68

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0260ACPT

Total depth: 100.07 ft

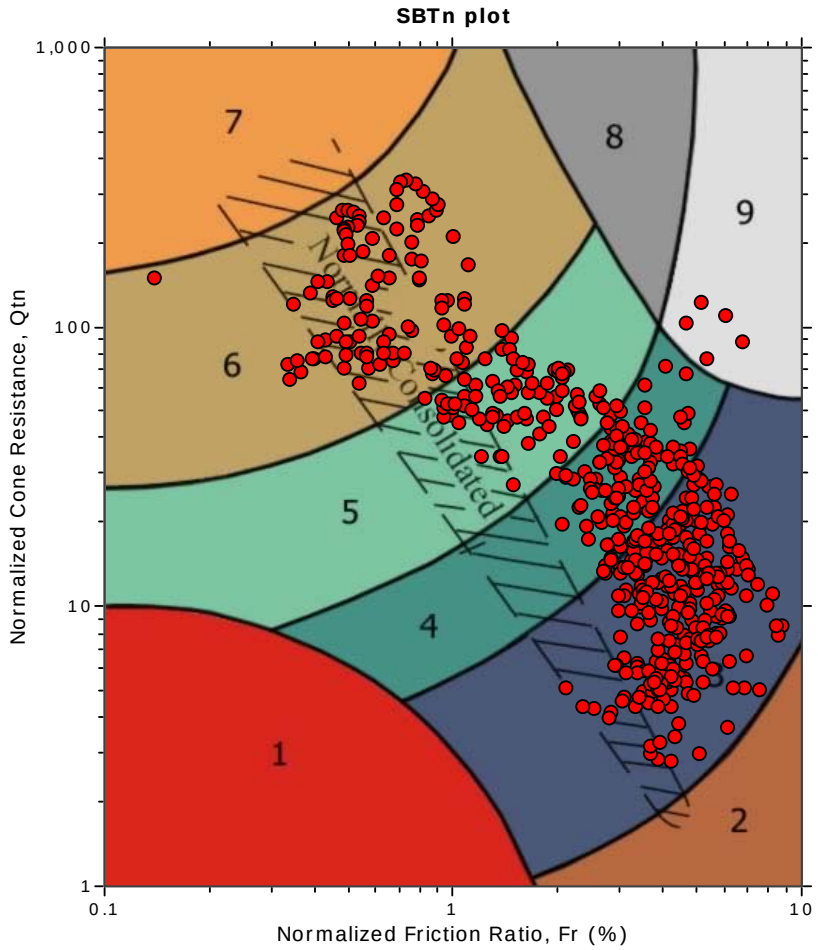
Surface Elevation: 277.88 ft

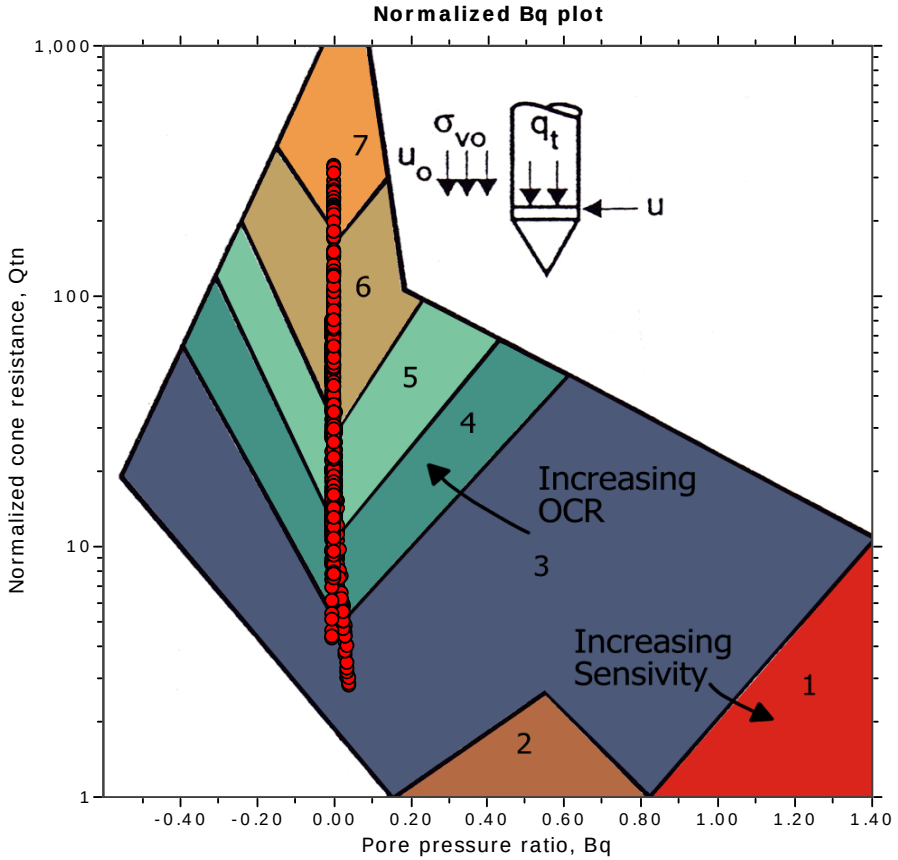
Coords: X:6463638.58, Y:1769922.68

Project: California High-Speed Train

Location: Fresno-Bakersfield

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0260ACPT

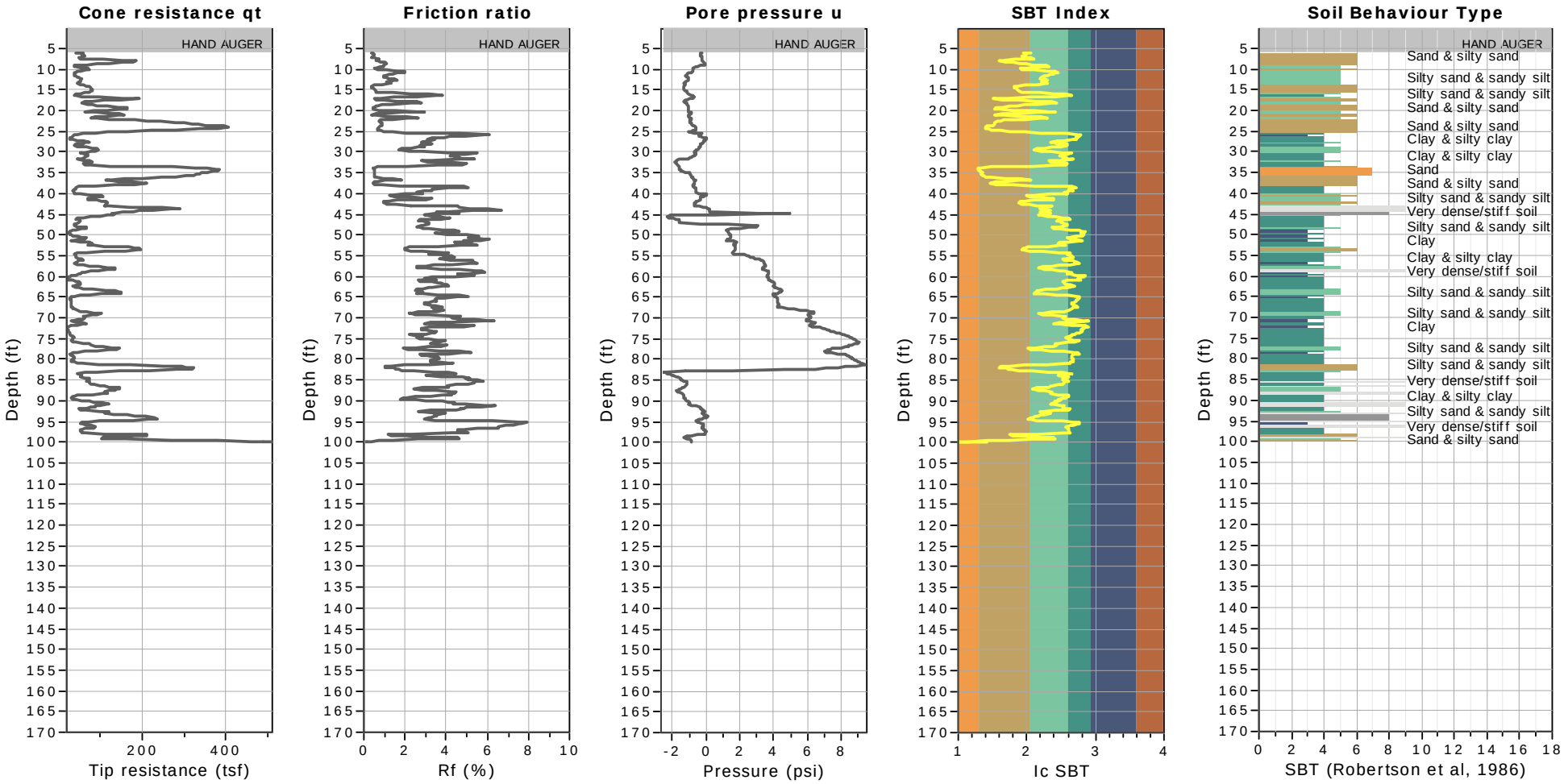
Total depth: 100.07 ft

Surface Elevation: 277.88 ft

Coords: X:6463638.58, Y:1769922.68

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0260ACPT

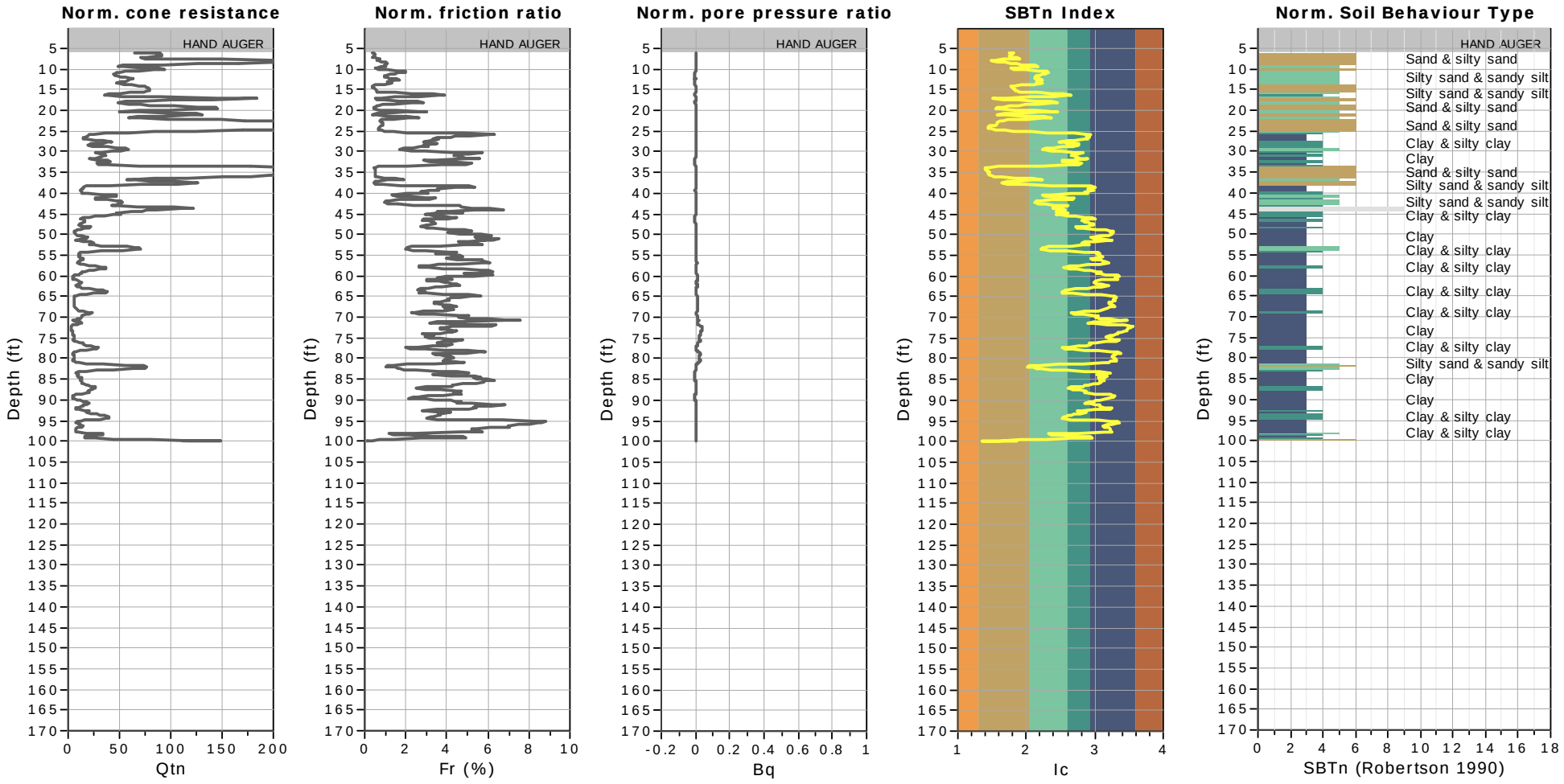
Total depth: 100.07 ft

Surface Elevation: 277.88 ft

Coords: X:6463638.58, Y:1769922.68

Project: California High-Speed Train

Location: Fresno-Bakersfield

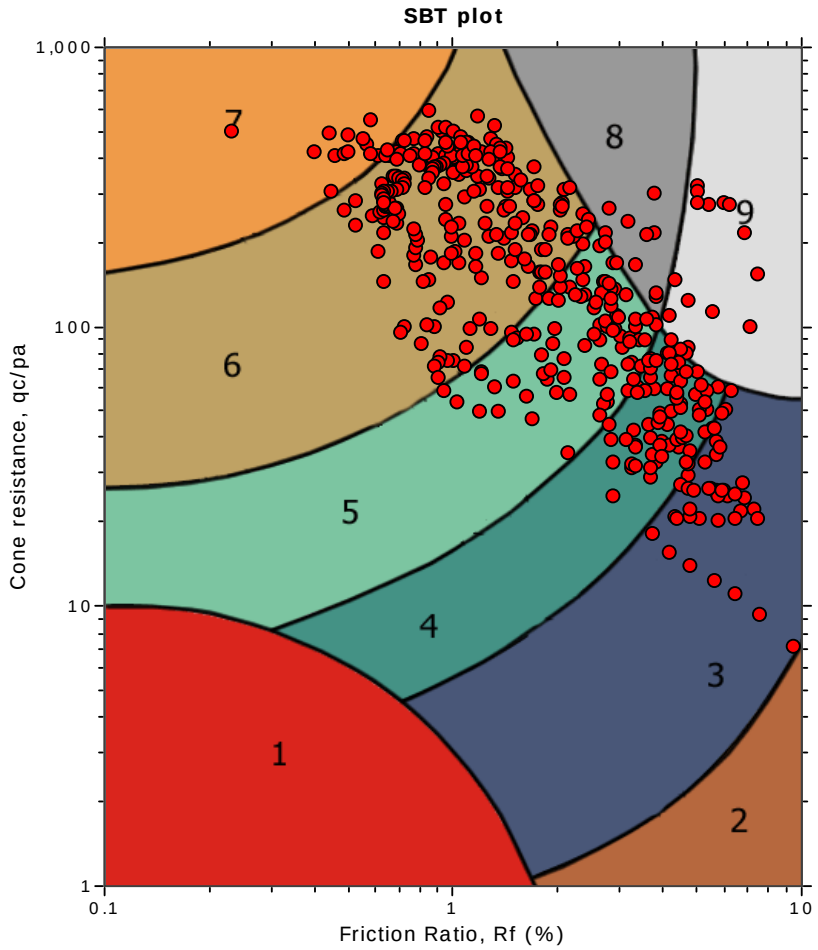


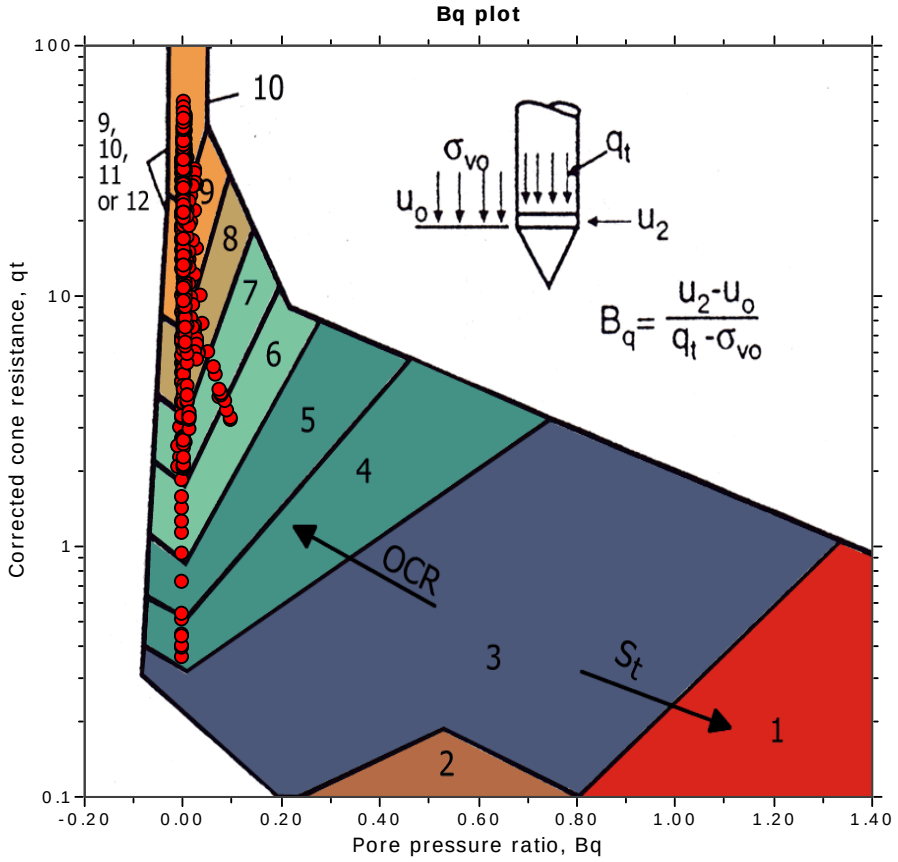
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0261CPT
Total depth: 82.35 ft
Surface Elevation: 285.56 ft
Coords: X:6166461.96, Y:2437959.57

SBT - Bq plots





SBT legend

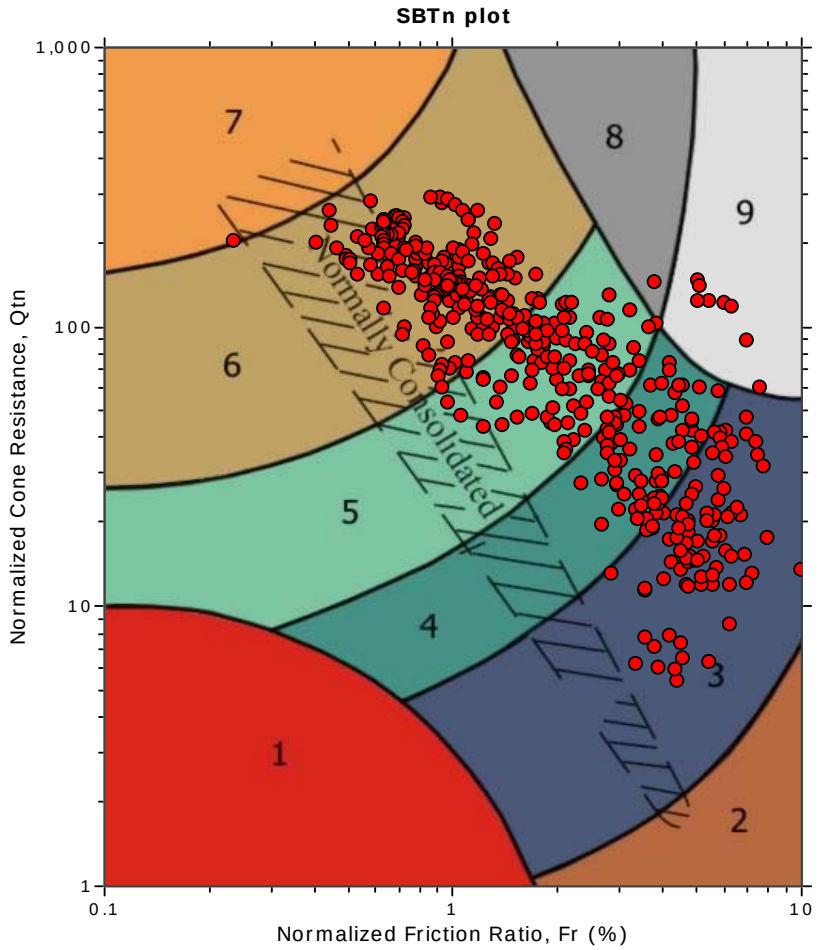
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

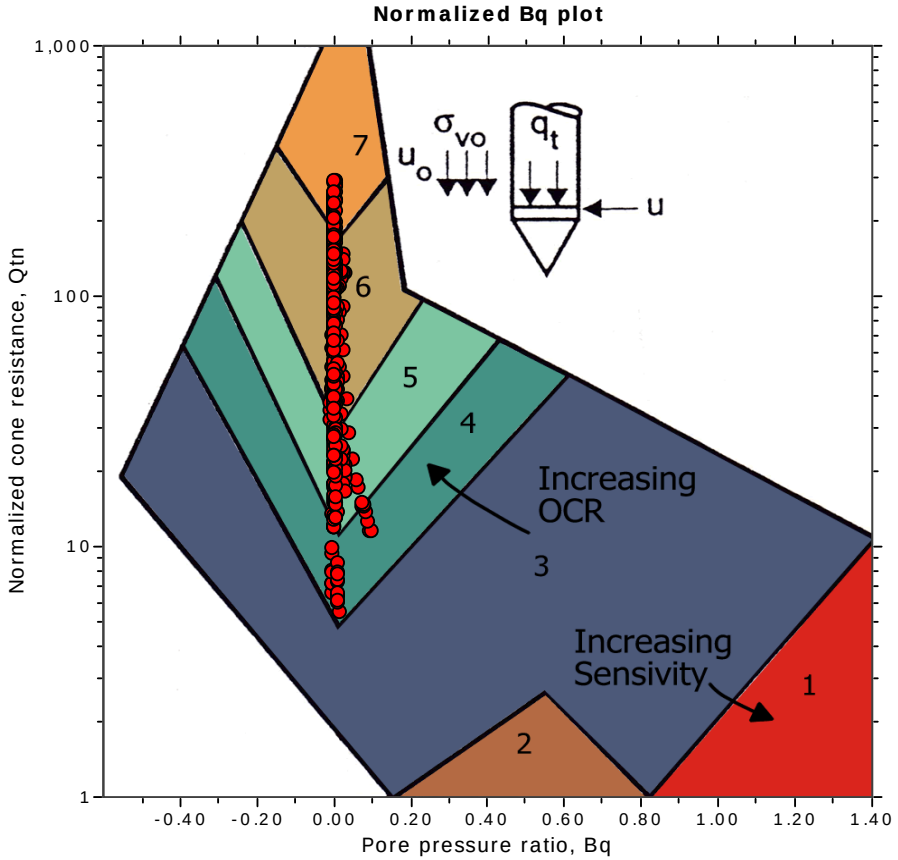
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0261CPT
Total depth: 82.35 ft
Surface Elevation: 285.56 ft
Coords: X:6166461.96, Y:2437959.57

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0261CPT

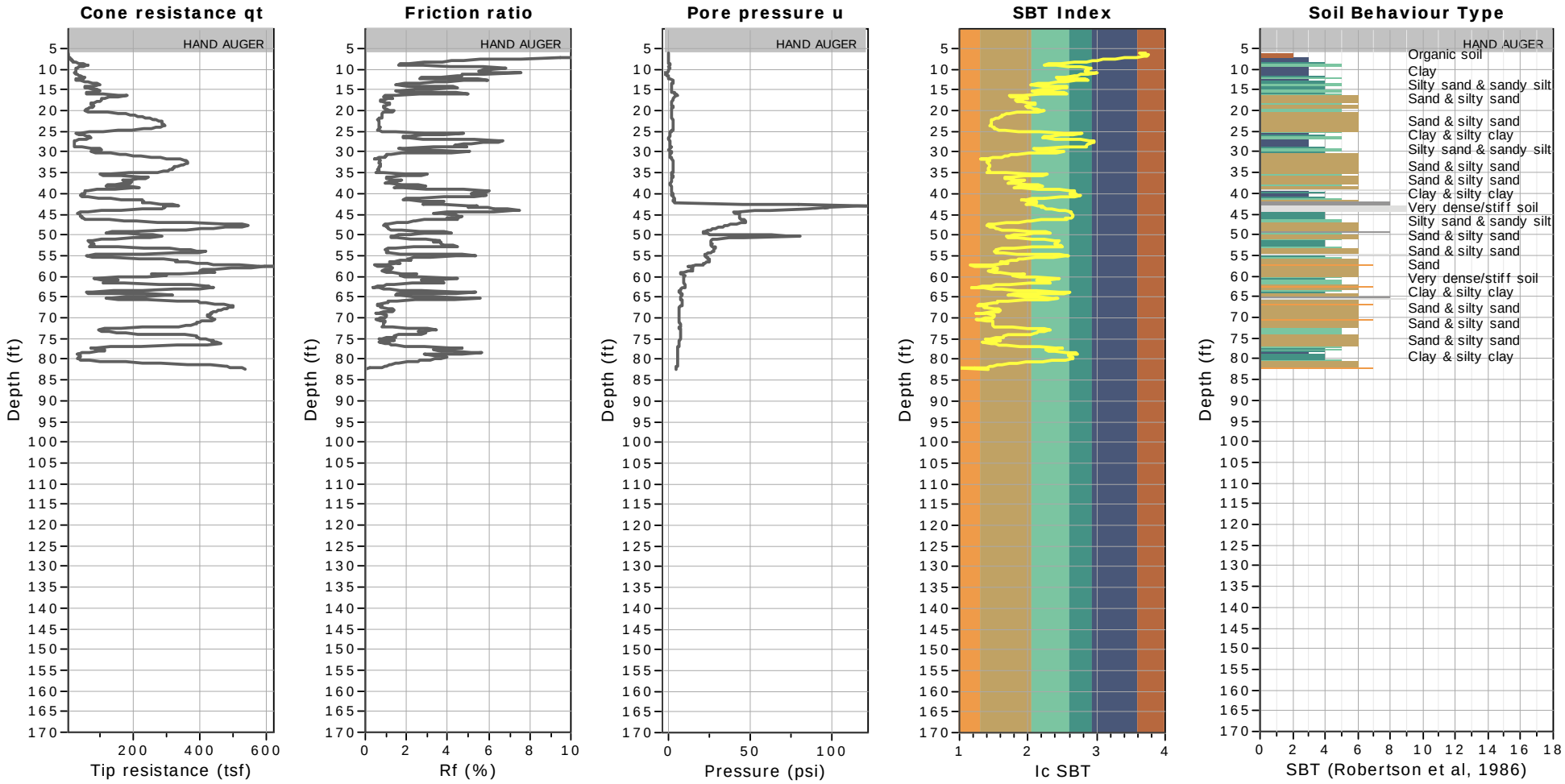
Total depth: 82.35 ft

Surface Elevation: 285.56 ft

Coords: X:6166461.96, Y:2437959.57

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0261CPT

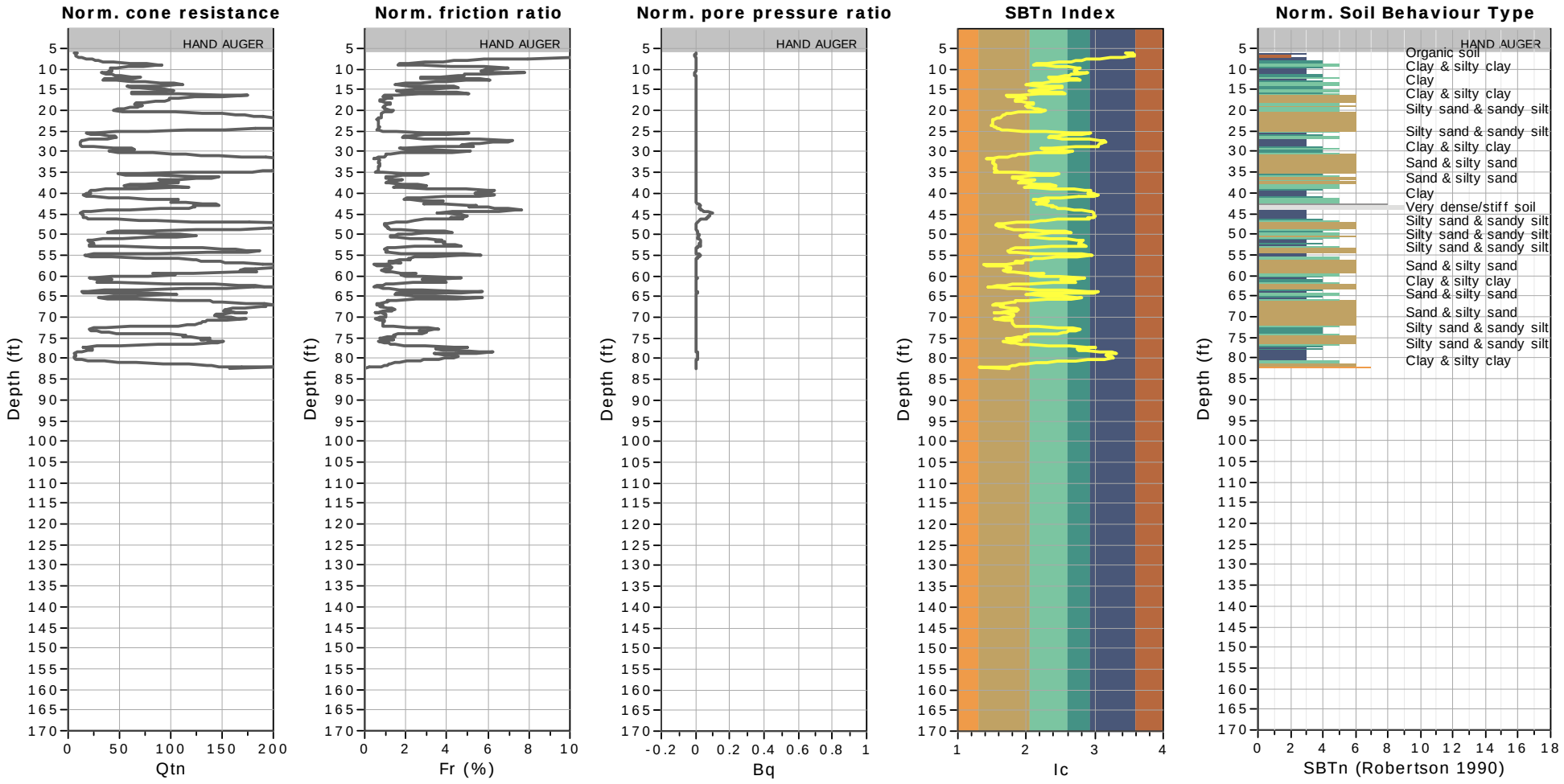
Total depth: 82.35 ft

Surface Elevation: 285.56 ft

Coords: X:6166461.96, Y:2437959.57

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

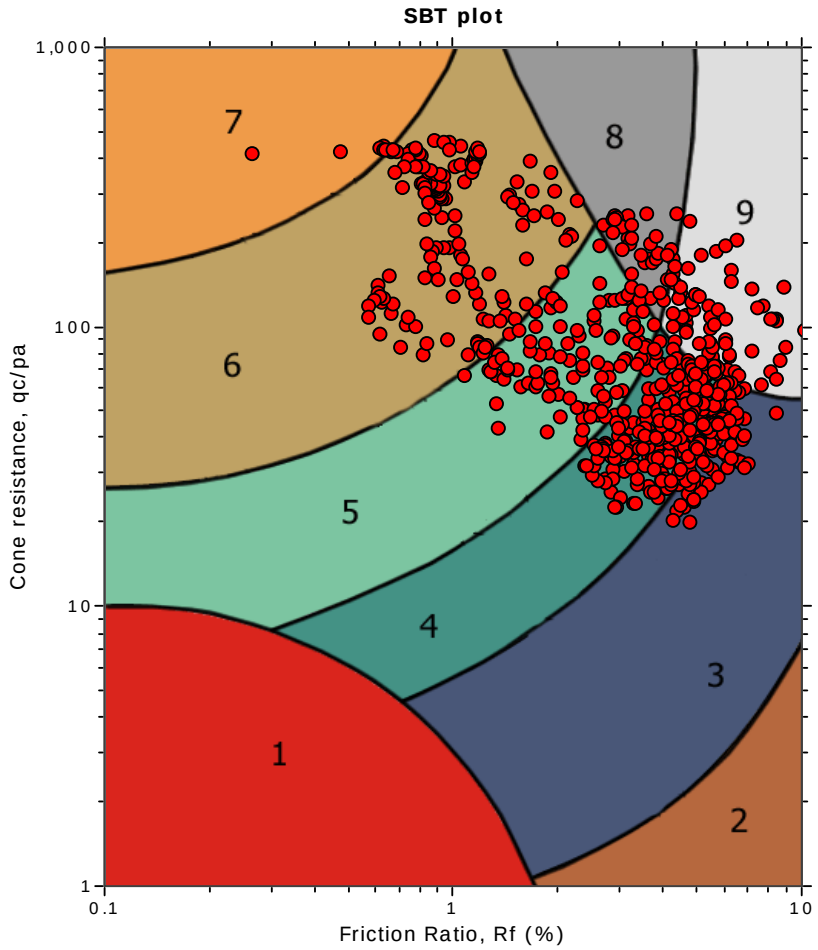
SBTn legend

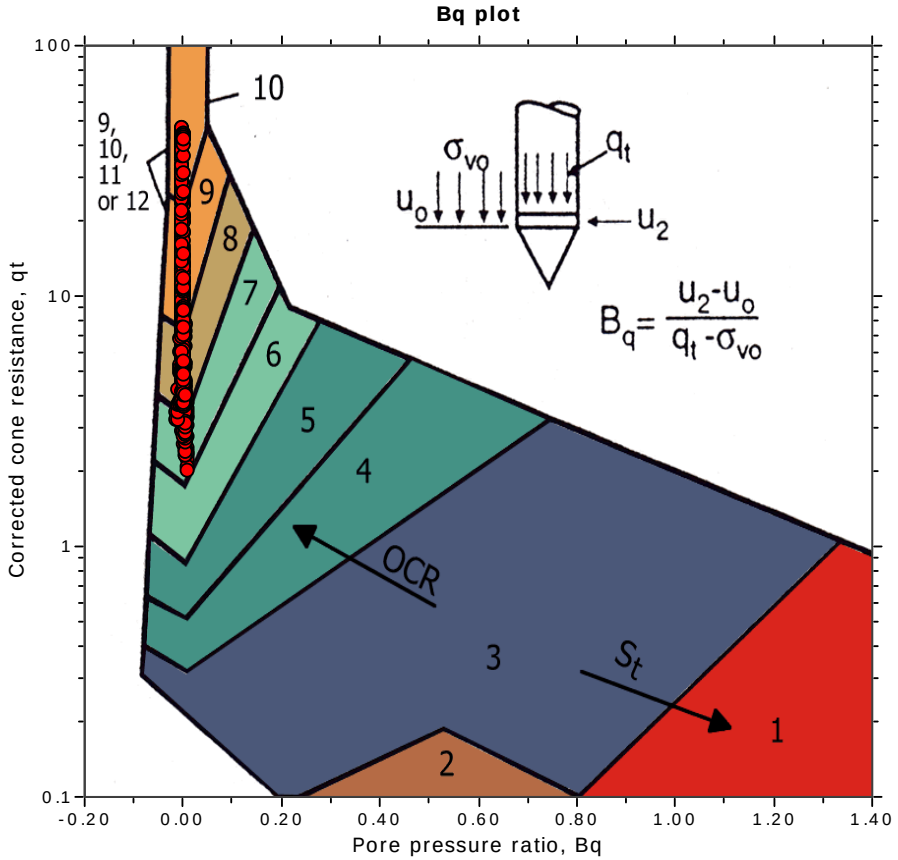
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0262CPT
Total depth: 115.16 ft
Surface Elevation: 292.74 ft
Coords: X:6166646.50, Y:2435541.52

SBT - Bq plots





SBT legend

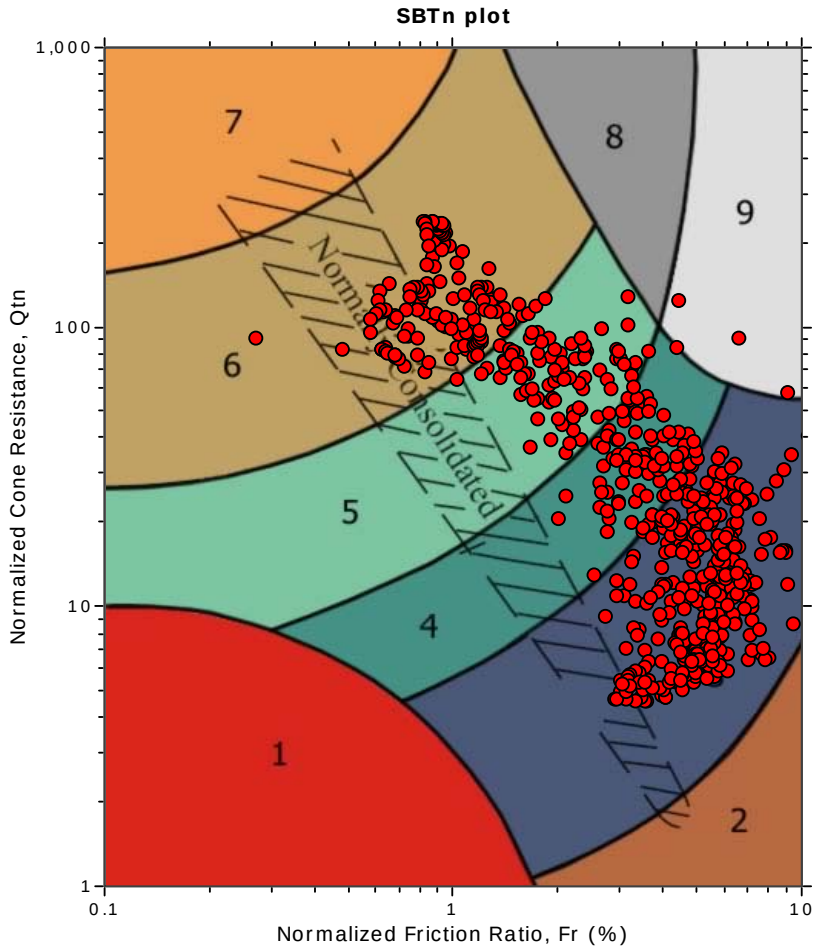
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

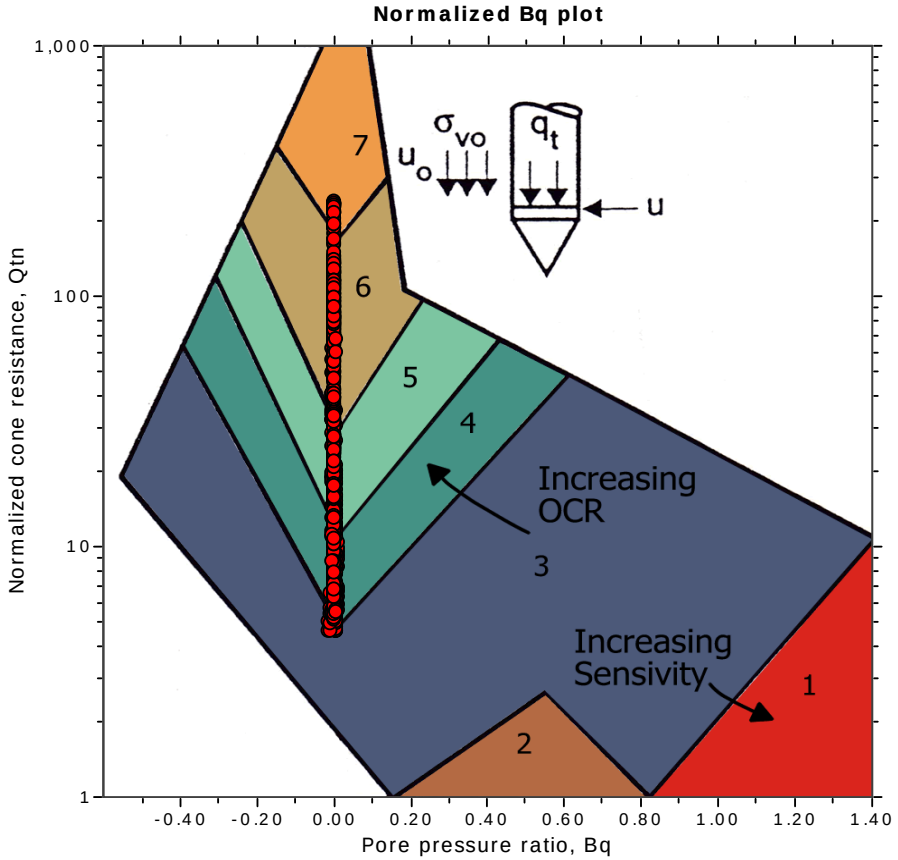
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0262CPT
Total depth: 115.16 ft
Surface Elevation: 292.74 ft
Coords: X:6166646.50, Y:2435541.52

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

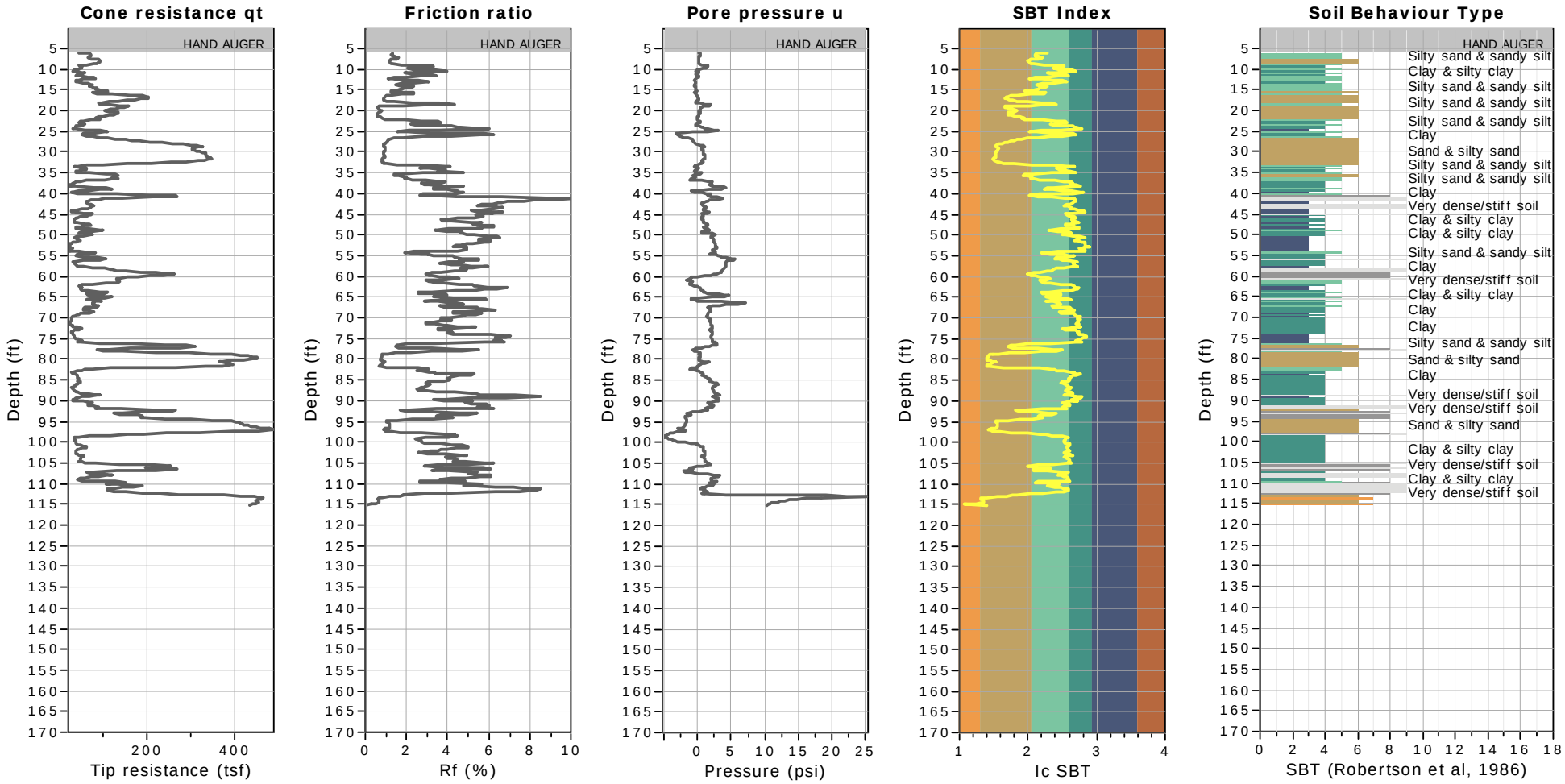
Location: Fresno-Bakersfield

CPT: S0262CPT

Total depth: 115.16 ft

Surface Elevation: 292.74 ft

Coords: X:6166646.50, Y:2435541.52



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0262CPT

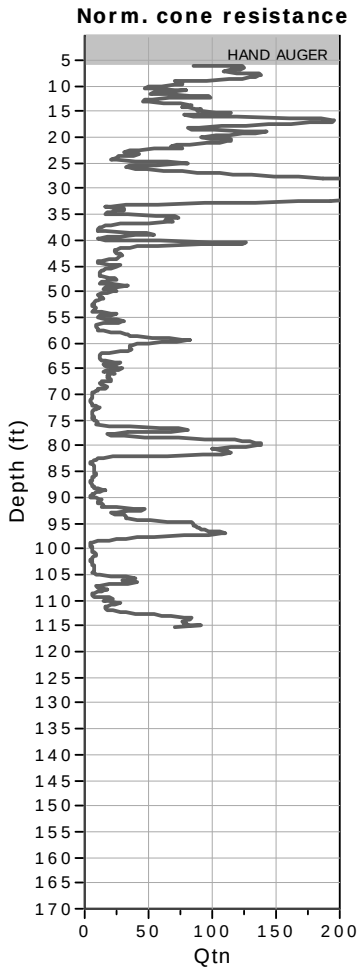
Total depth: 115.16 ft

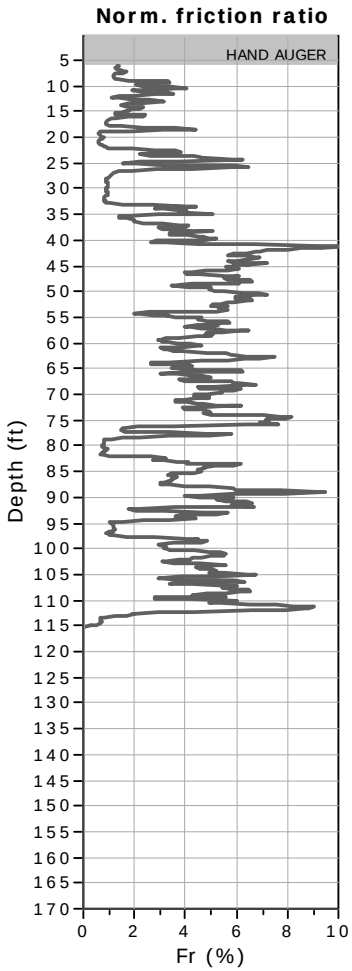
Surface Elevation: 292.74 ft

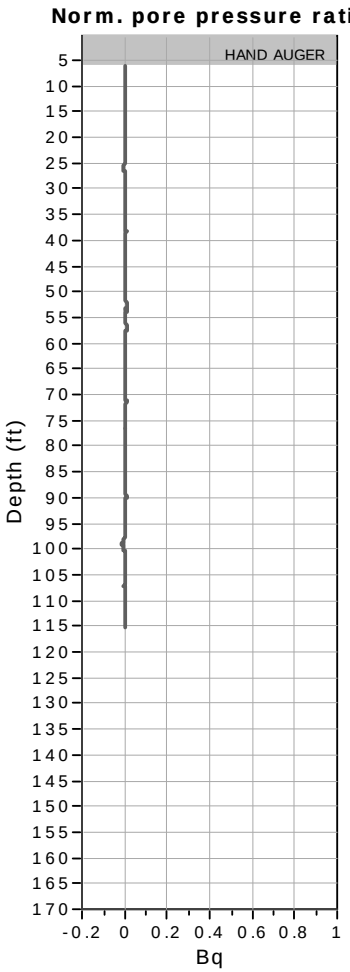
Coords: X:6166646.50, Y:2435541.52

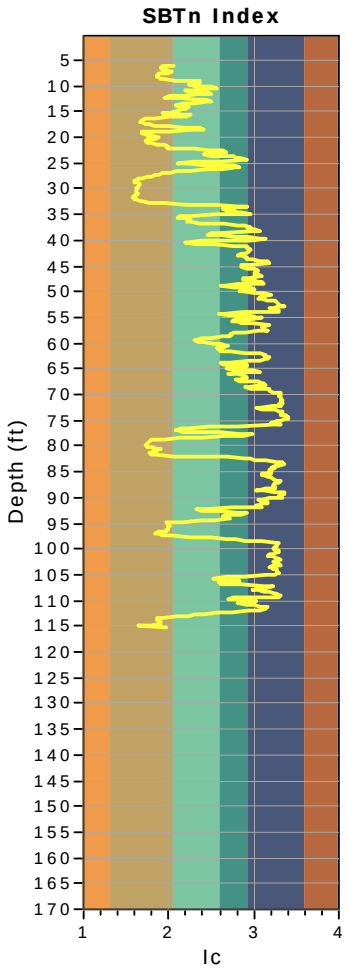
Project: California High-Speed Train

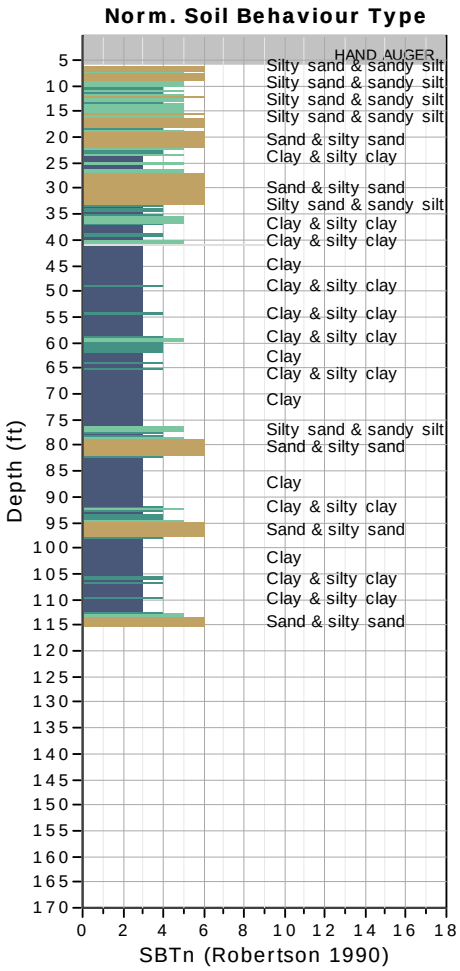
Location: Fresno-Bakersfield









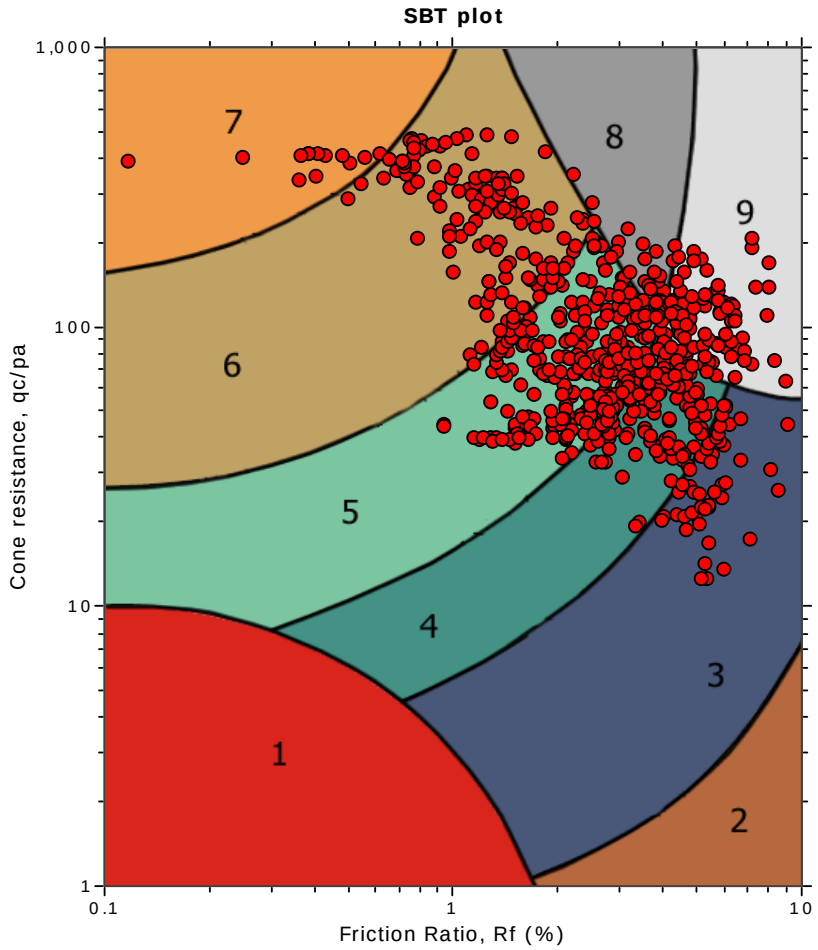


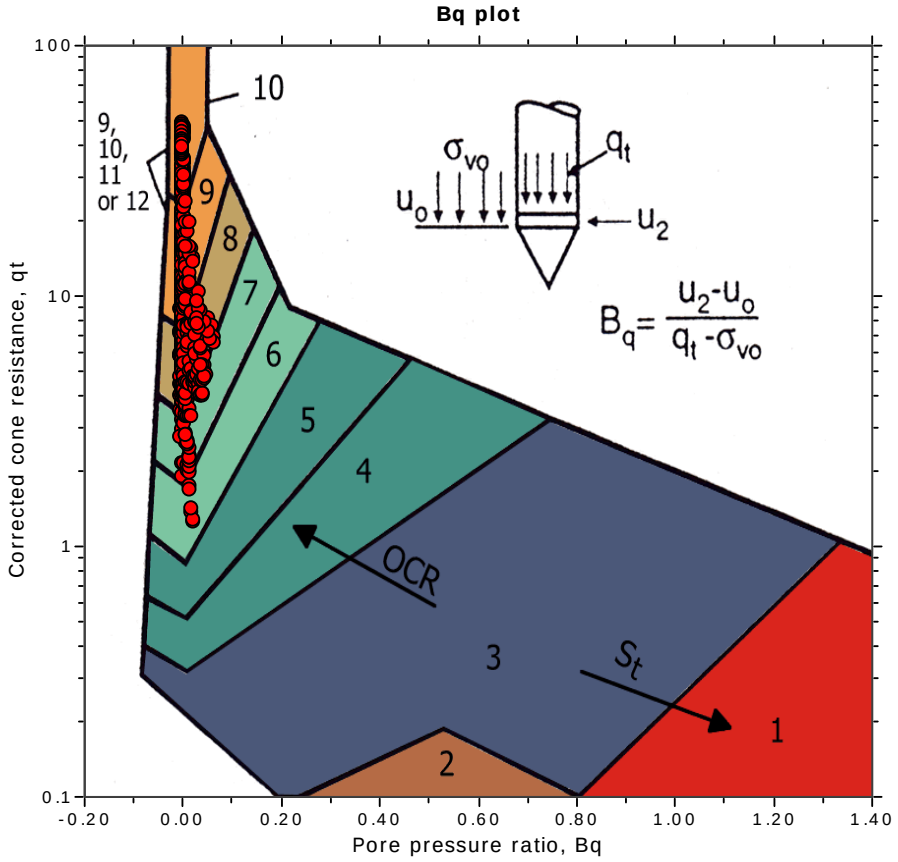
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



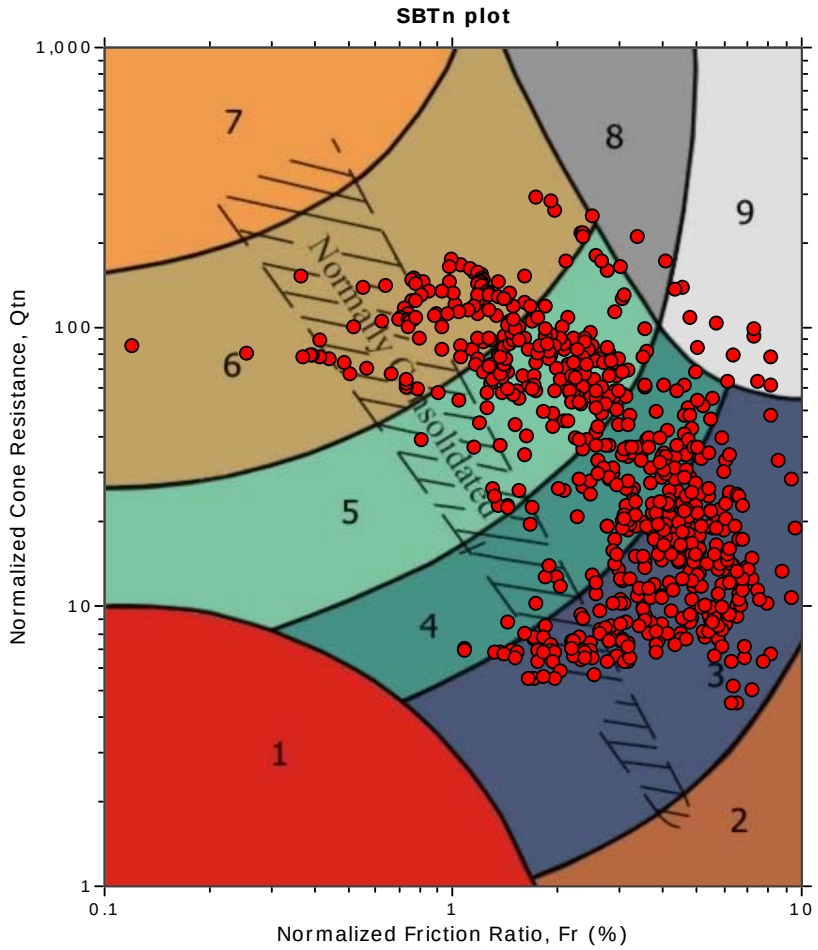


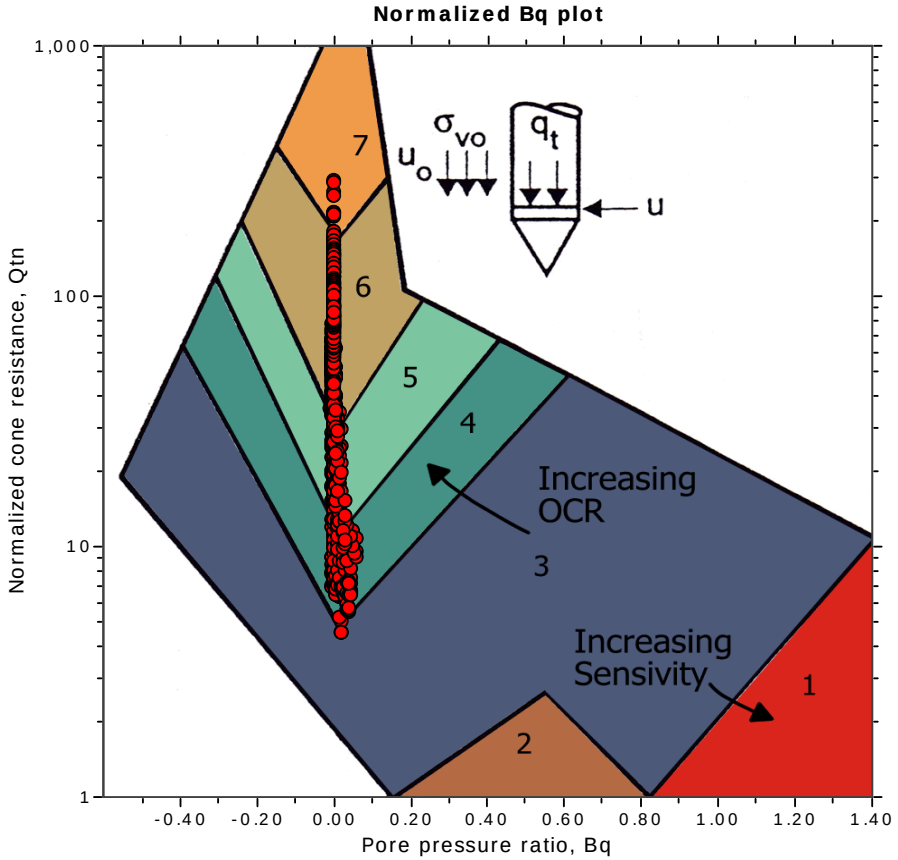
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0263CPT

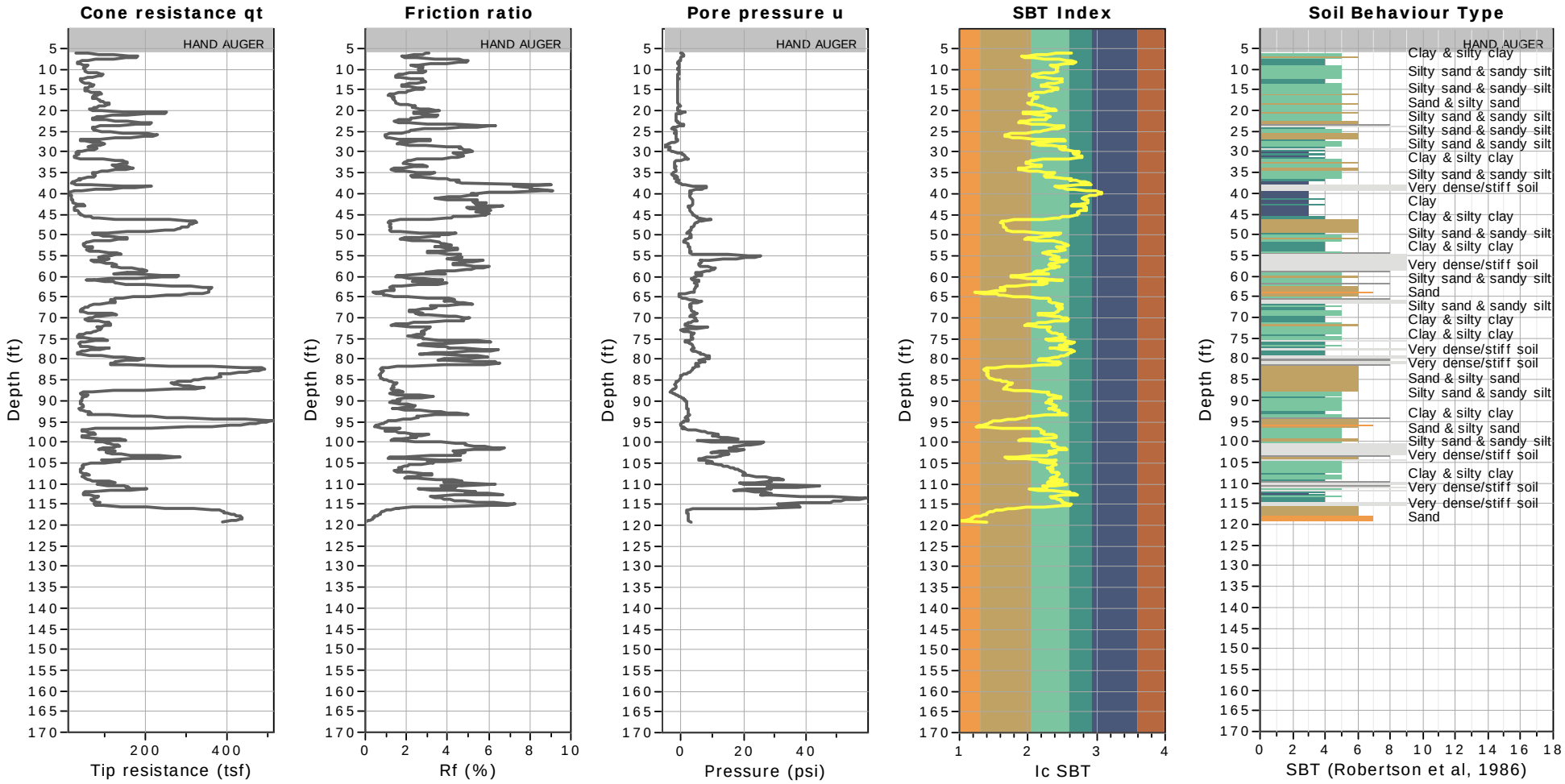
Total depth: 119.09 ft

Surface Elevation: 295.10 ft

Coords: X:6166524.28, Y:2434477.14

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

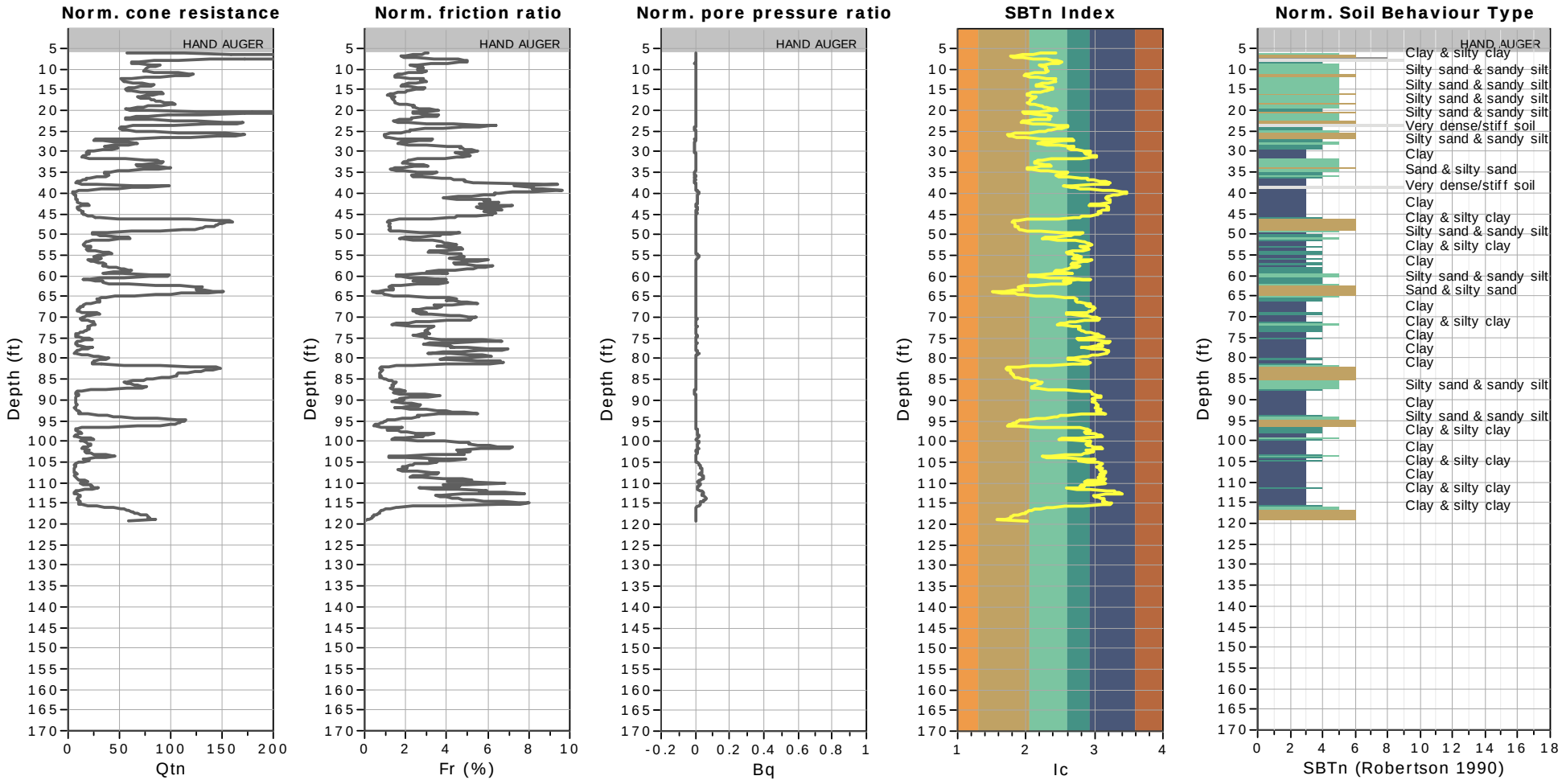
Location: Fresno-Bakersfield

CPT: S0263CPT

Total depth: 119.09 ft

Surface Elevation: 295.10 ft

Coords: X:6166524.28, Y:2434477.14



SBTn legend

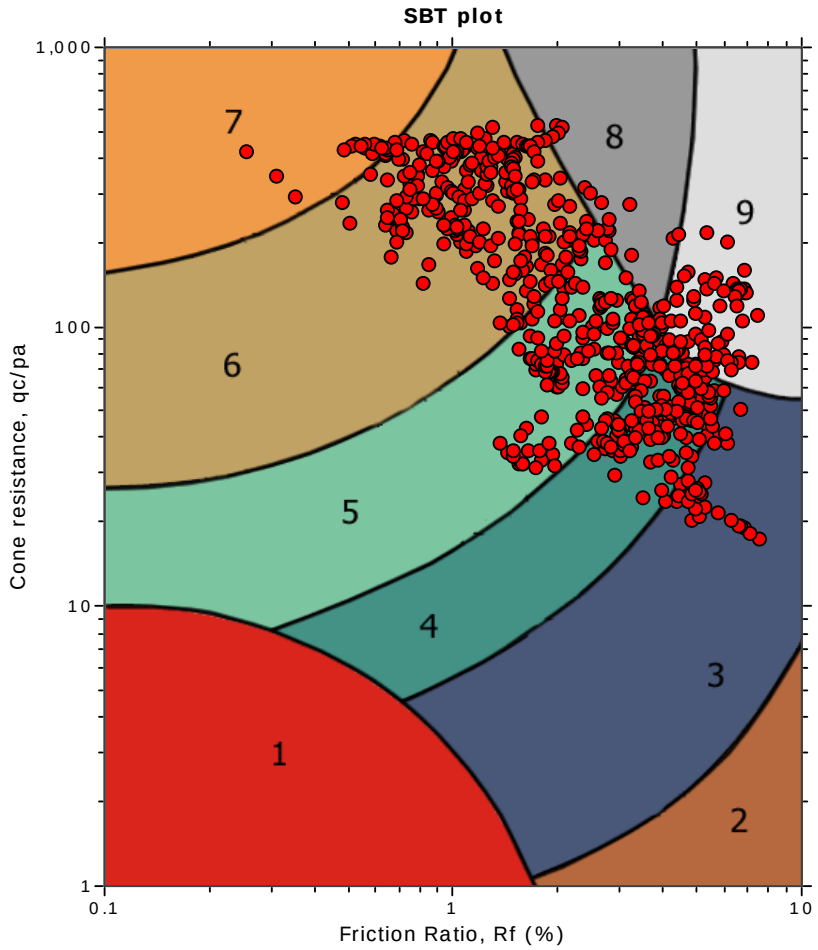
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

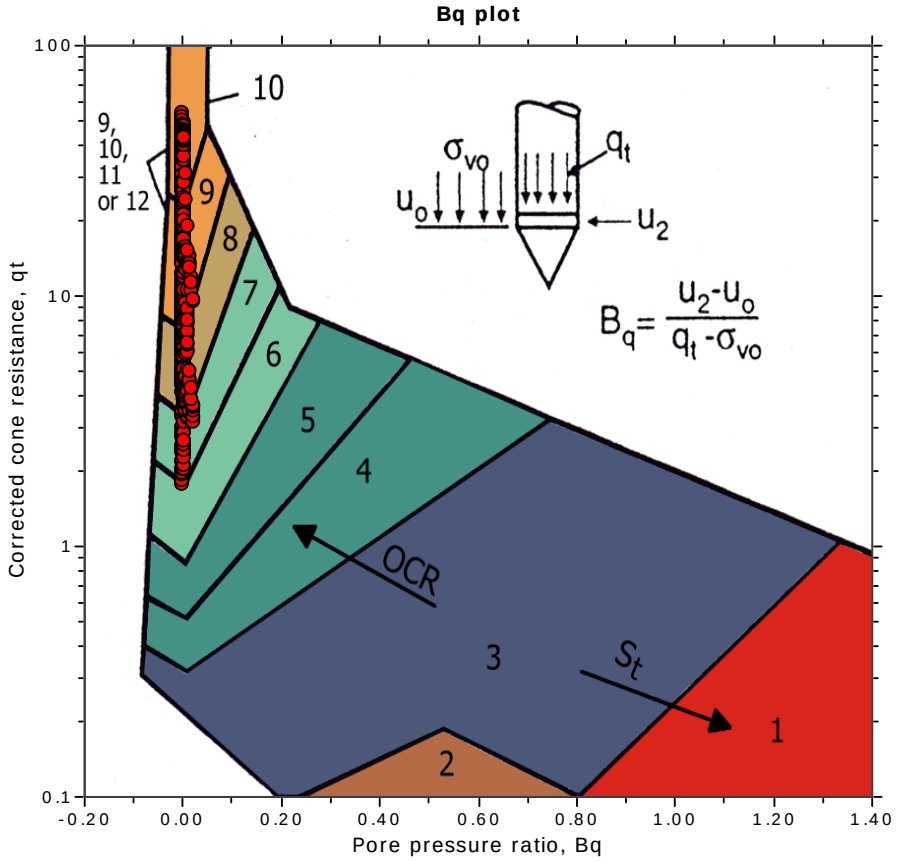
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0264CPT
Total depth: 115.49 ft
Surface Elevation: 299.11 ft
Coords: X:6166401.93, Y:2432729.78

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

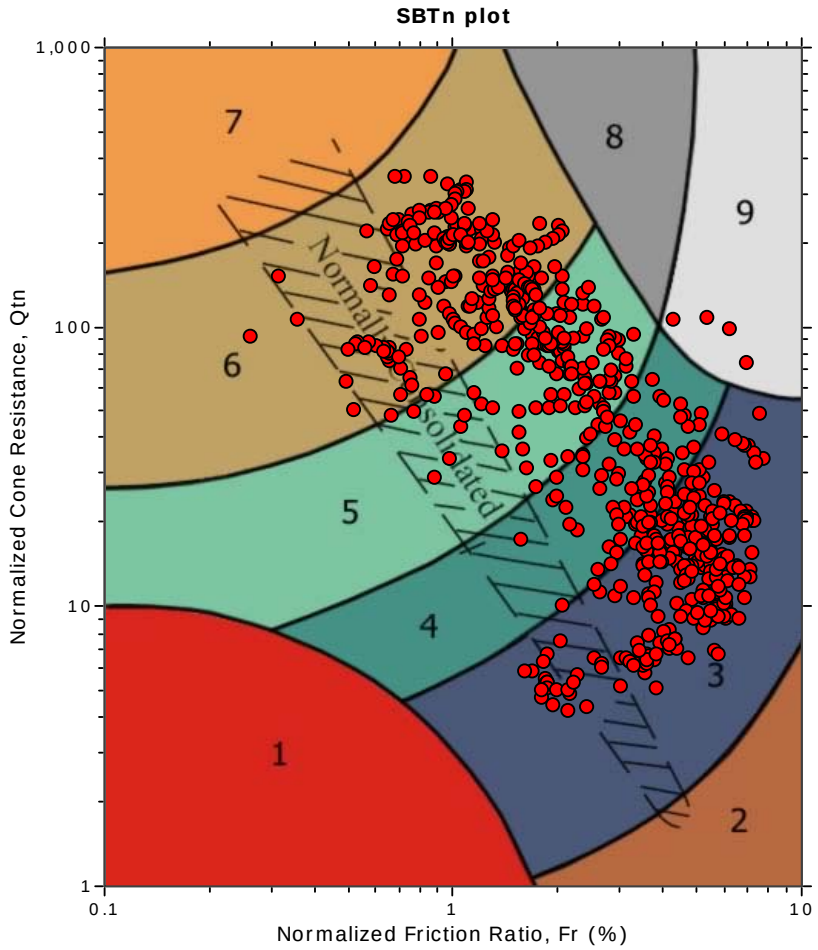
CPT: S0264CPT

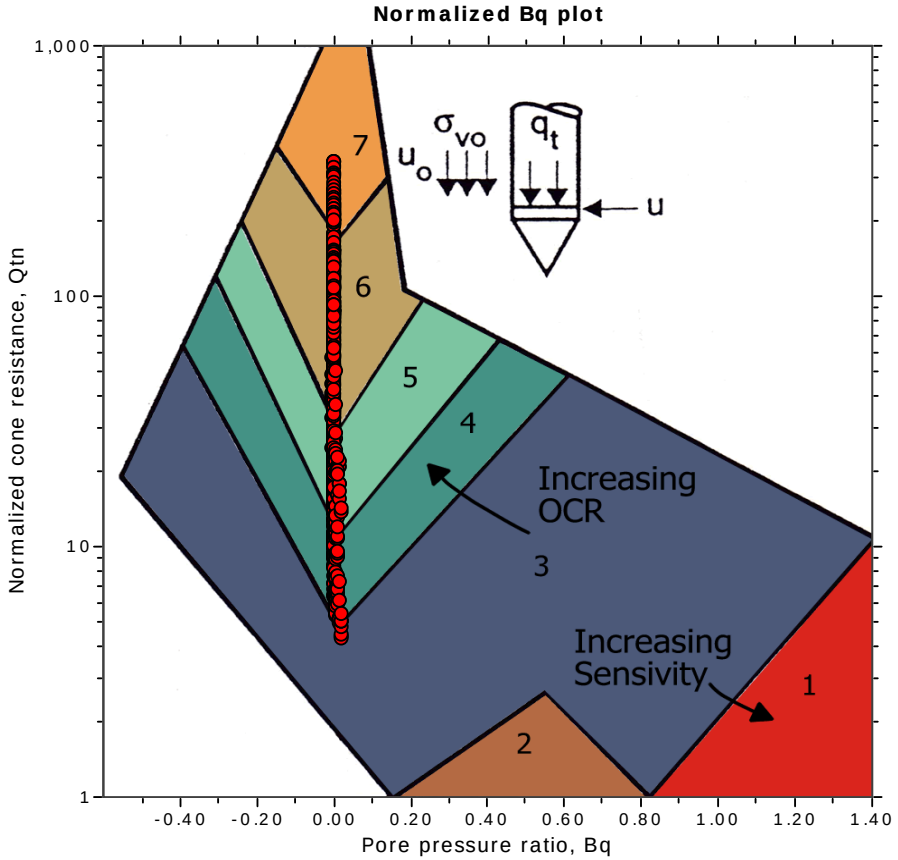
Total depth: 115.49 ft

Surface Elevation: 299.11 ft

Coords: X:6166401.93, Y:2432729.78

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0264CPT

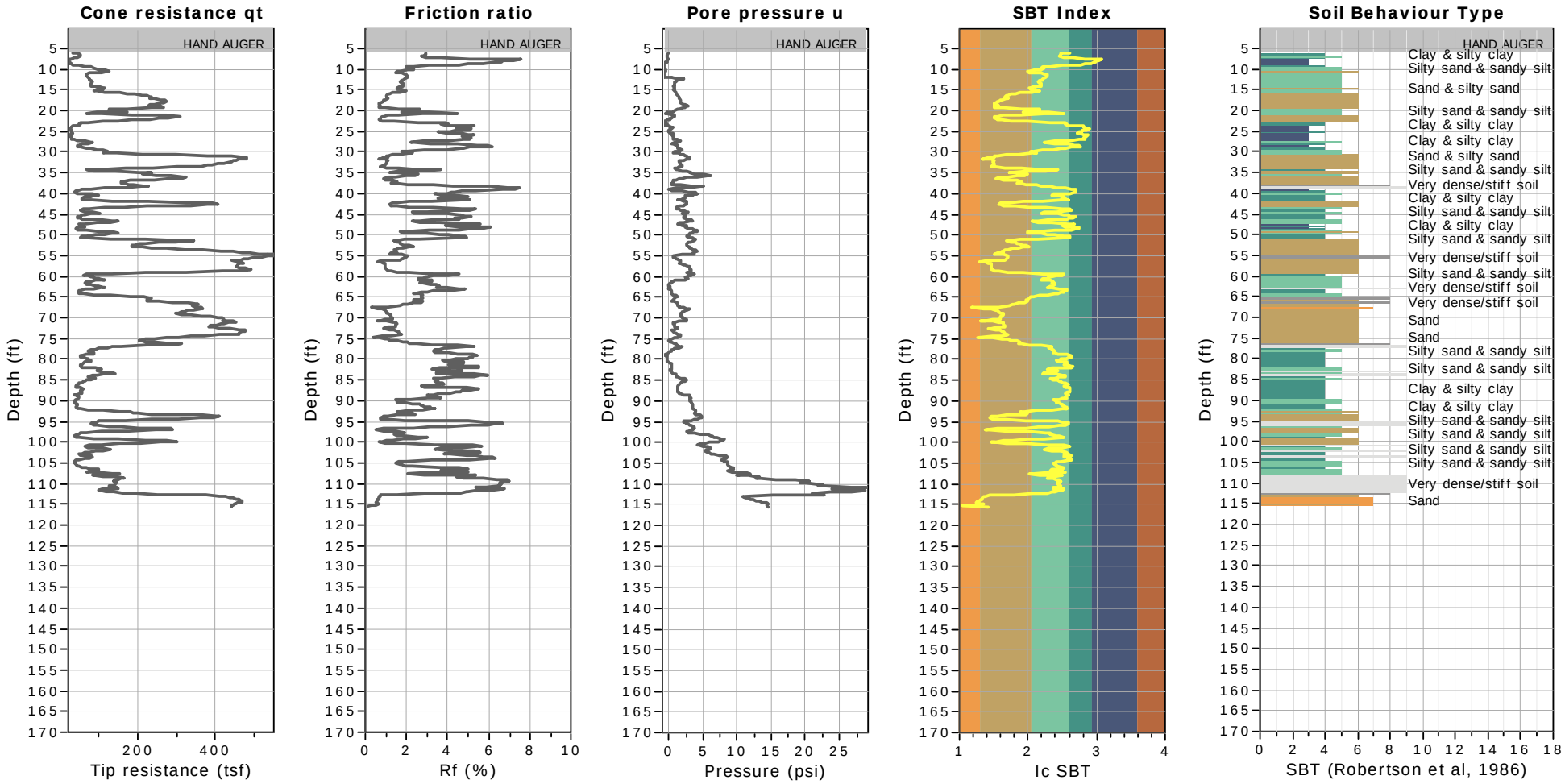
Total depth: 115.49 ft

Surface Elevation: 299.11 ft

Coords: X:6166401.93, Y:2432729.78

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

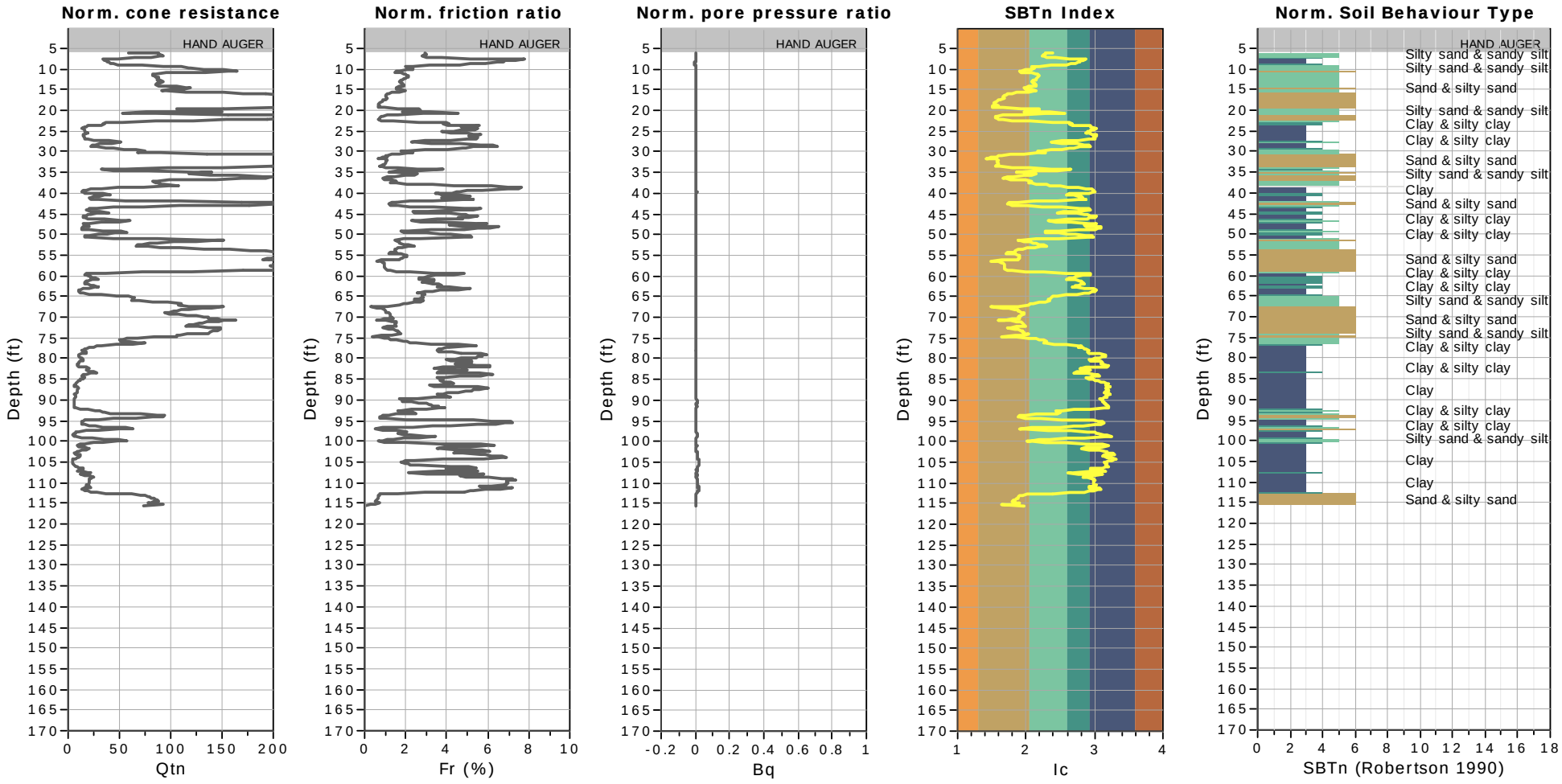
Location: Fresno-Bakersfield

CPT: S0264CPT

Total depth: 115.49 ft

Surface Elevation: 299.11 ft

Coords: X:6166401.93, Y:2432729.78



SBTn legend

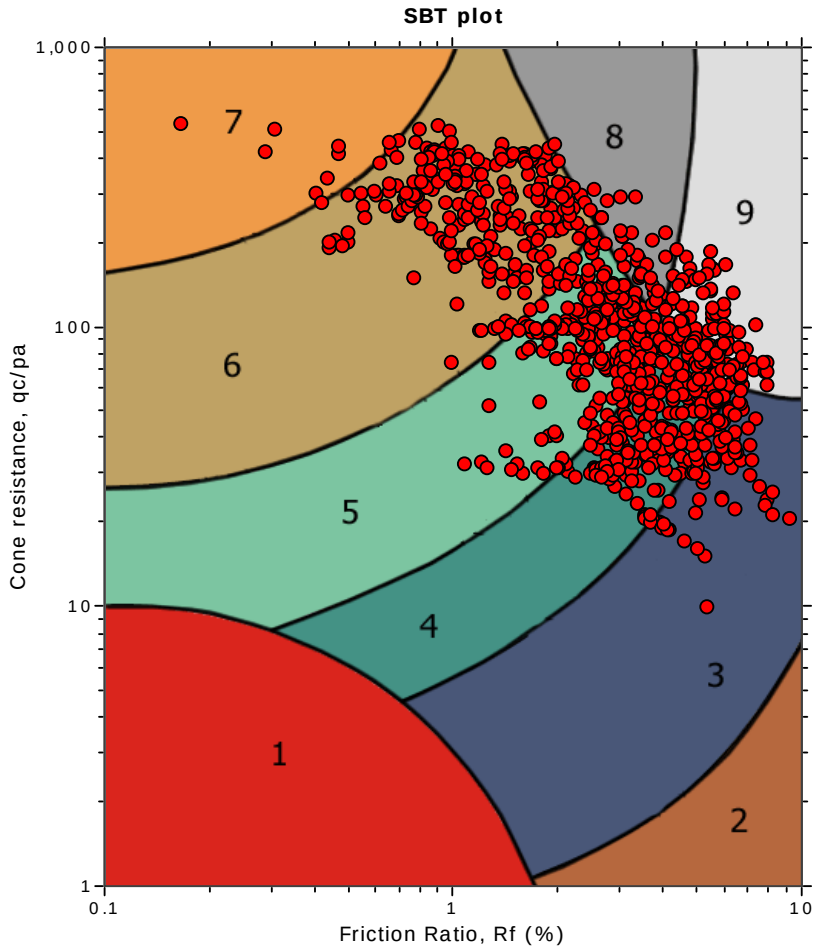
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

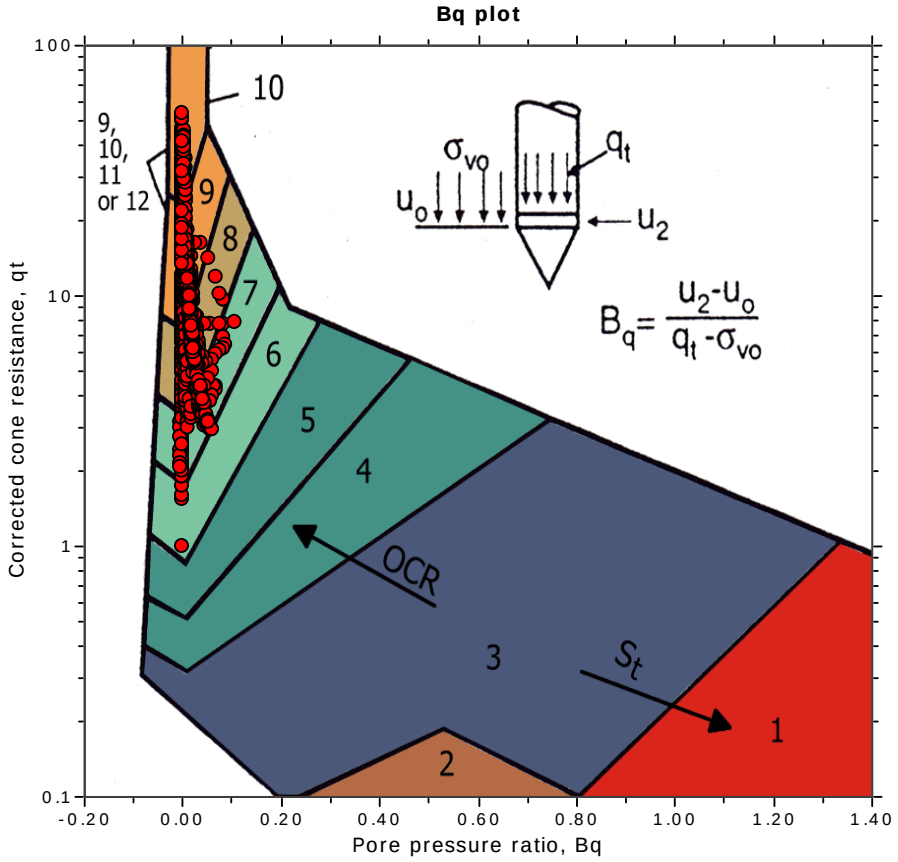
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0266CPT
Total depth: 157.48 ft
Surface Elevation: 307.27 ft
Coords: X:6166316.09, Y:2429029.08

SBT - Bq plots



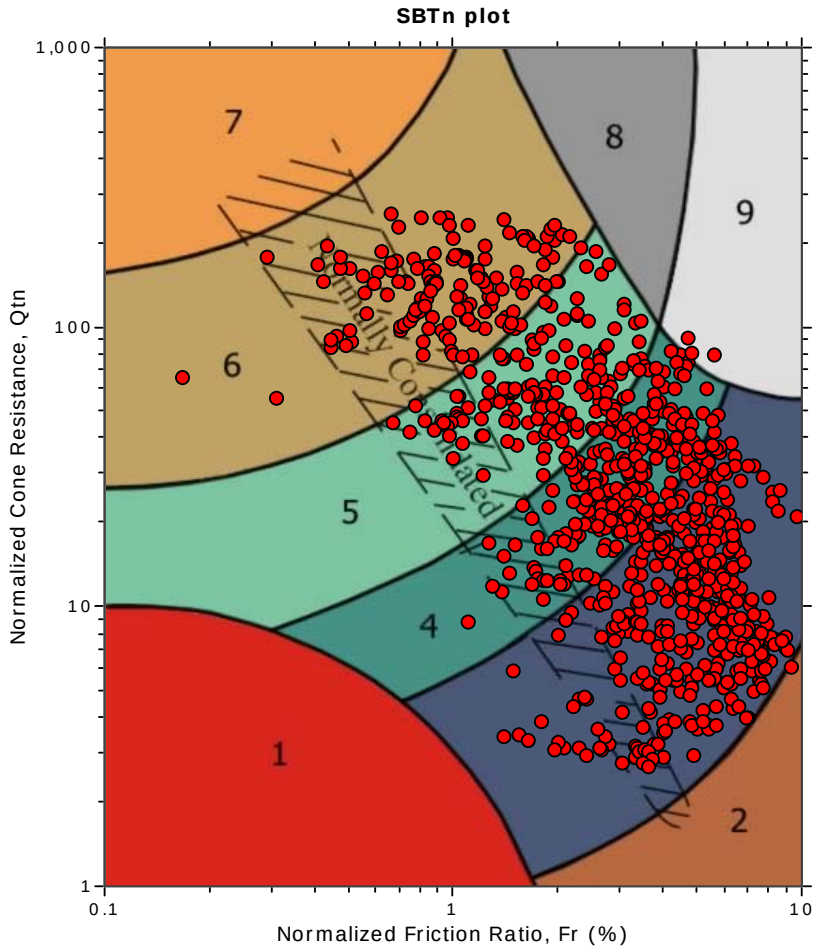


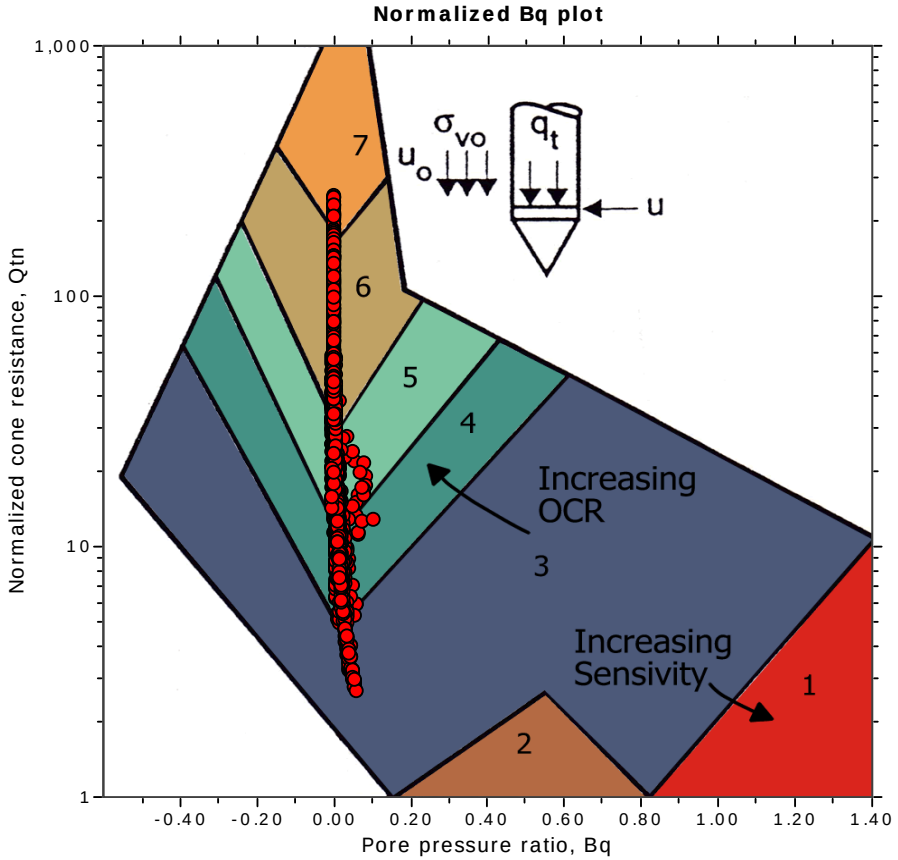
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0266CPT

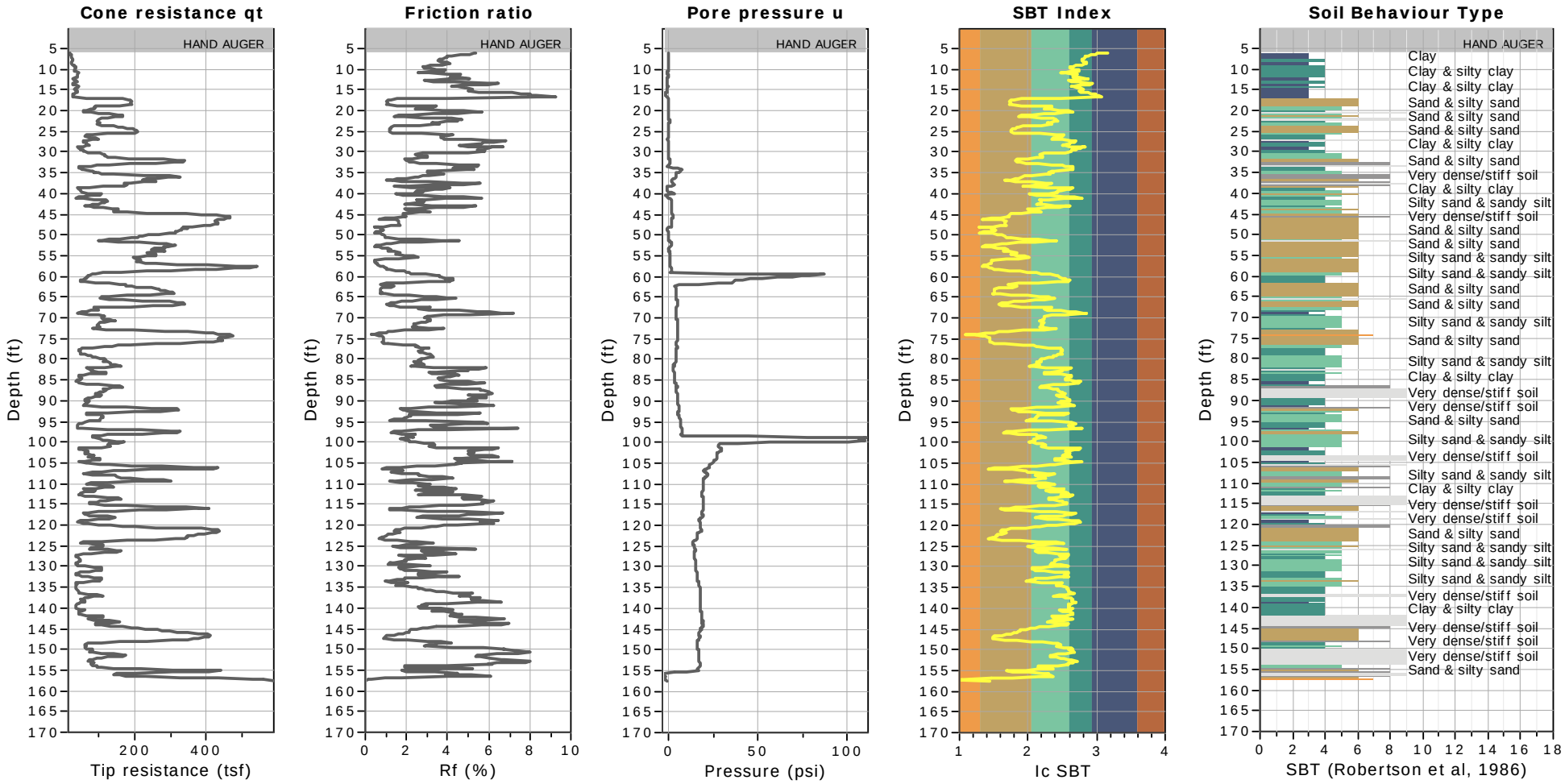
Total depth: 157.48 ft

Surface Elevation: 307.27 ft

Coords: X:6166316.09, Y:2429029.08

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0266CPT

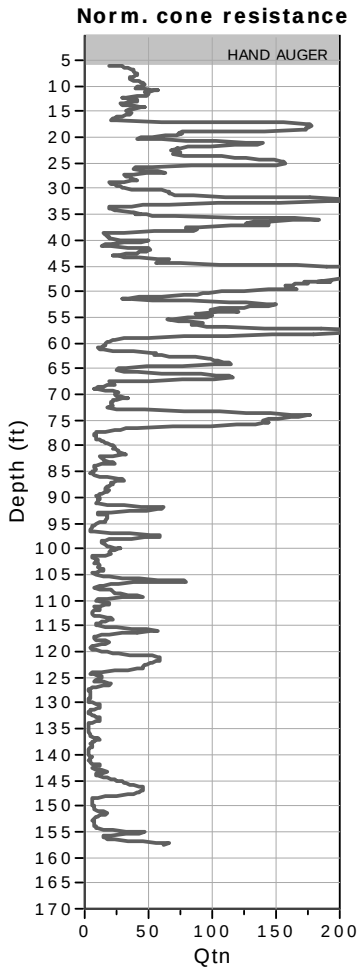
Total depth: 157.48 ft

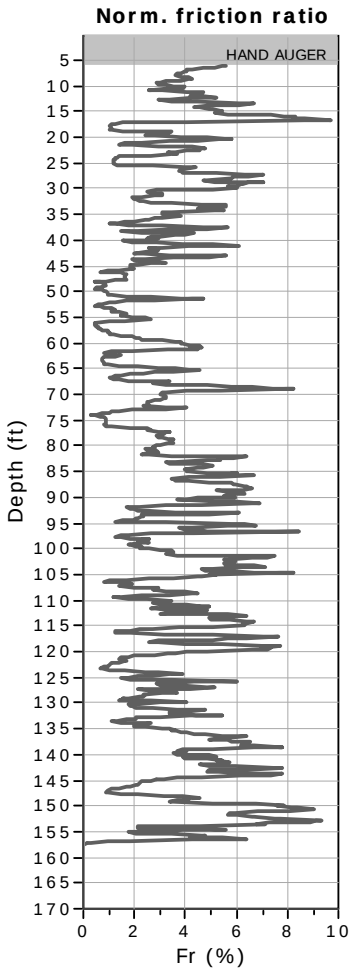
Surface Elevation: 307.27 ft

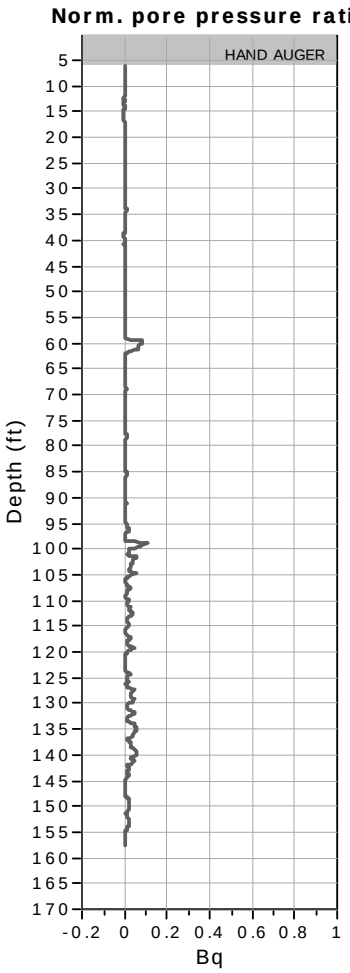
Coords: X:6166316.09, Y:2429029.08

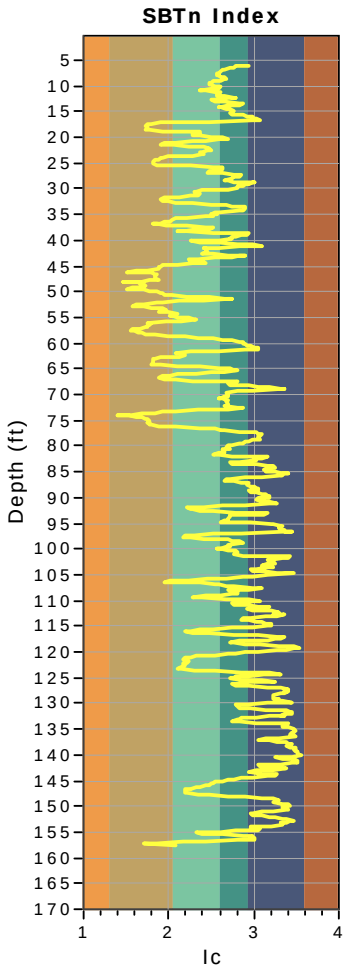
Project: California High-Speed Train

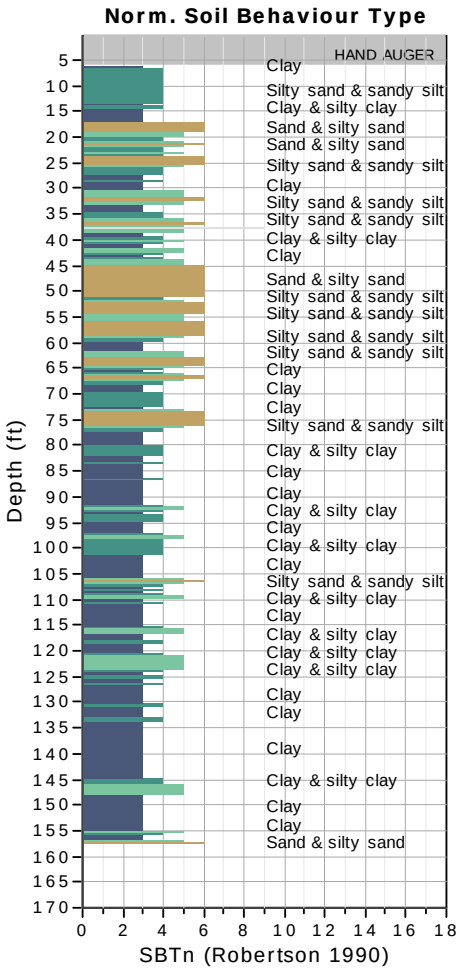
Location: Fresno-Bakersfield











SBTn legend

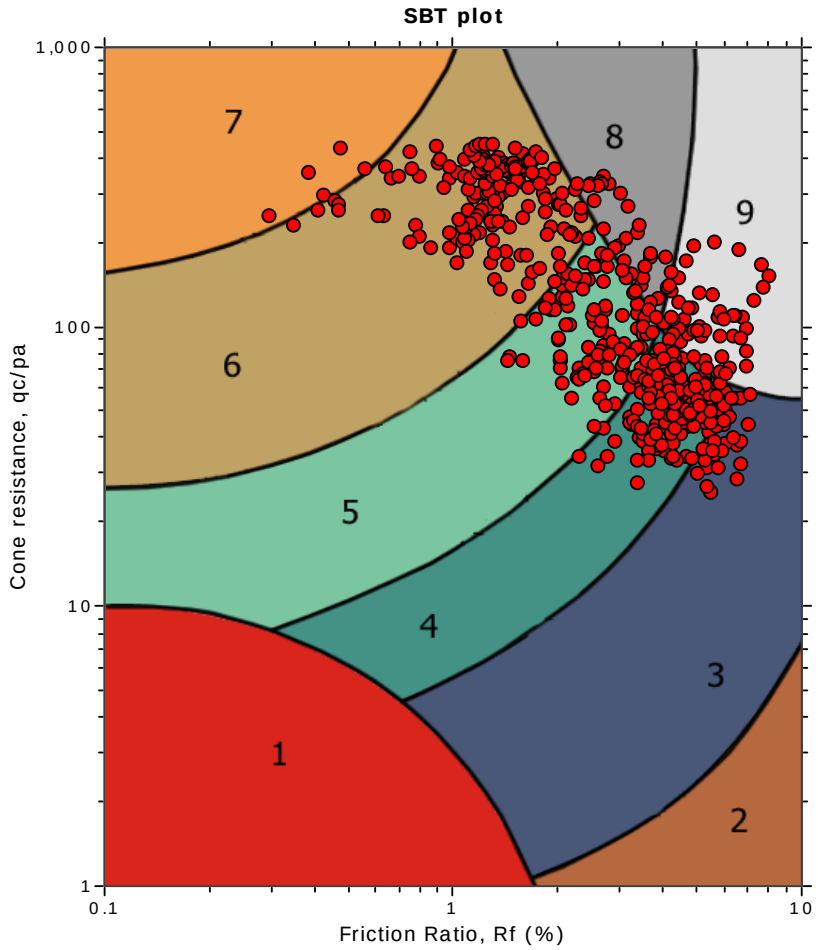
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

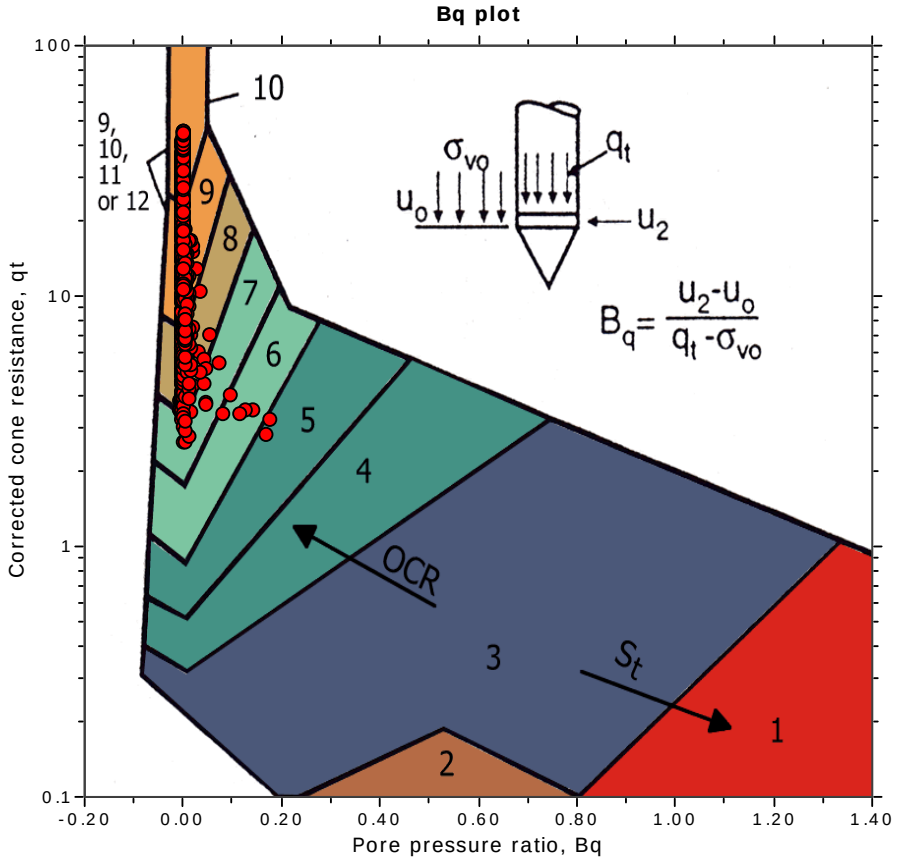
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0267CPT
Total depth: 100.23 ft
Surface Elevation: 304.36 ft
Coords: X:6165898.73, Y:2426390.03

SBT - Bq plots



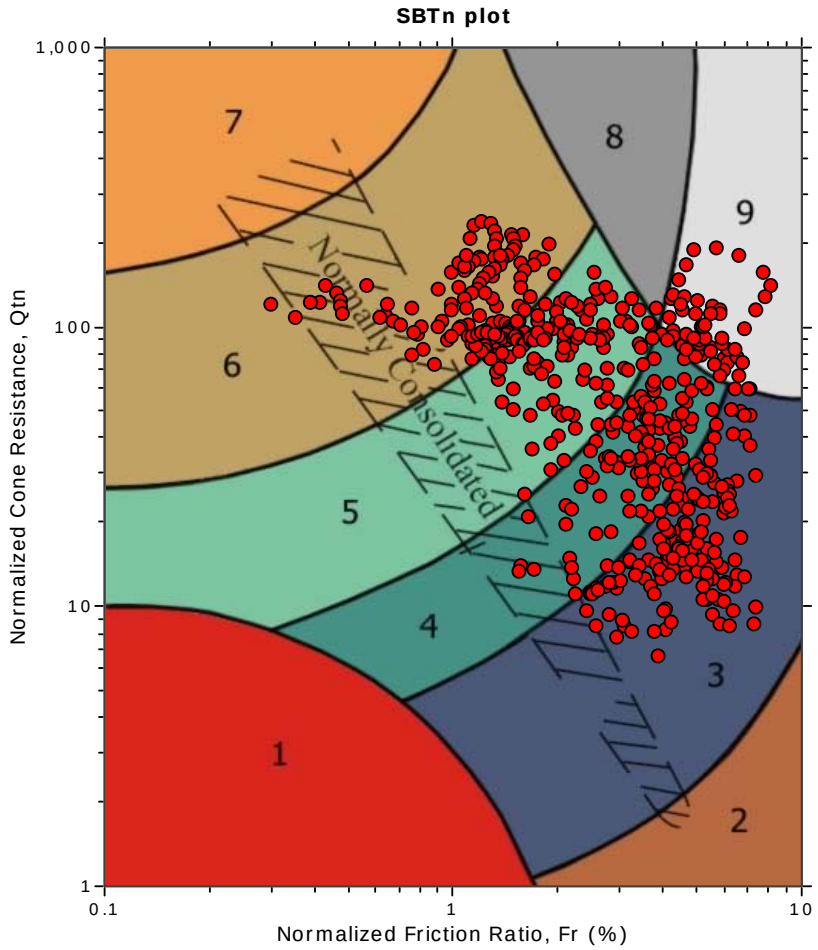


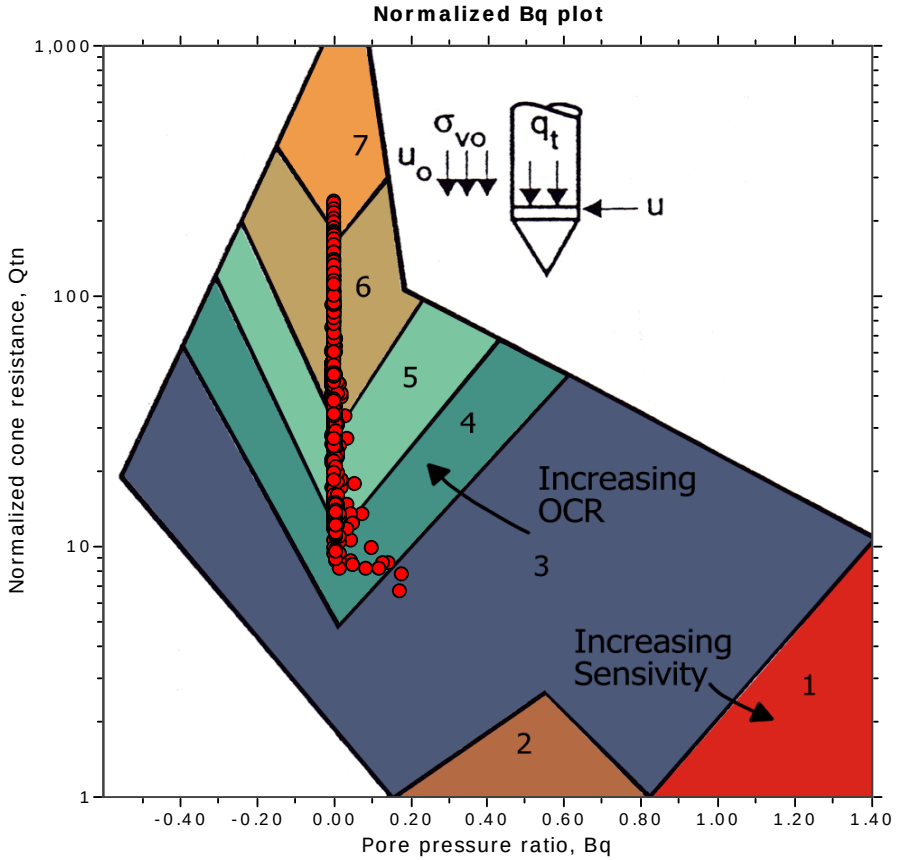
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

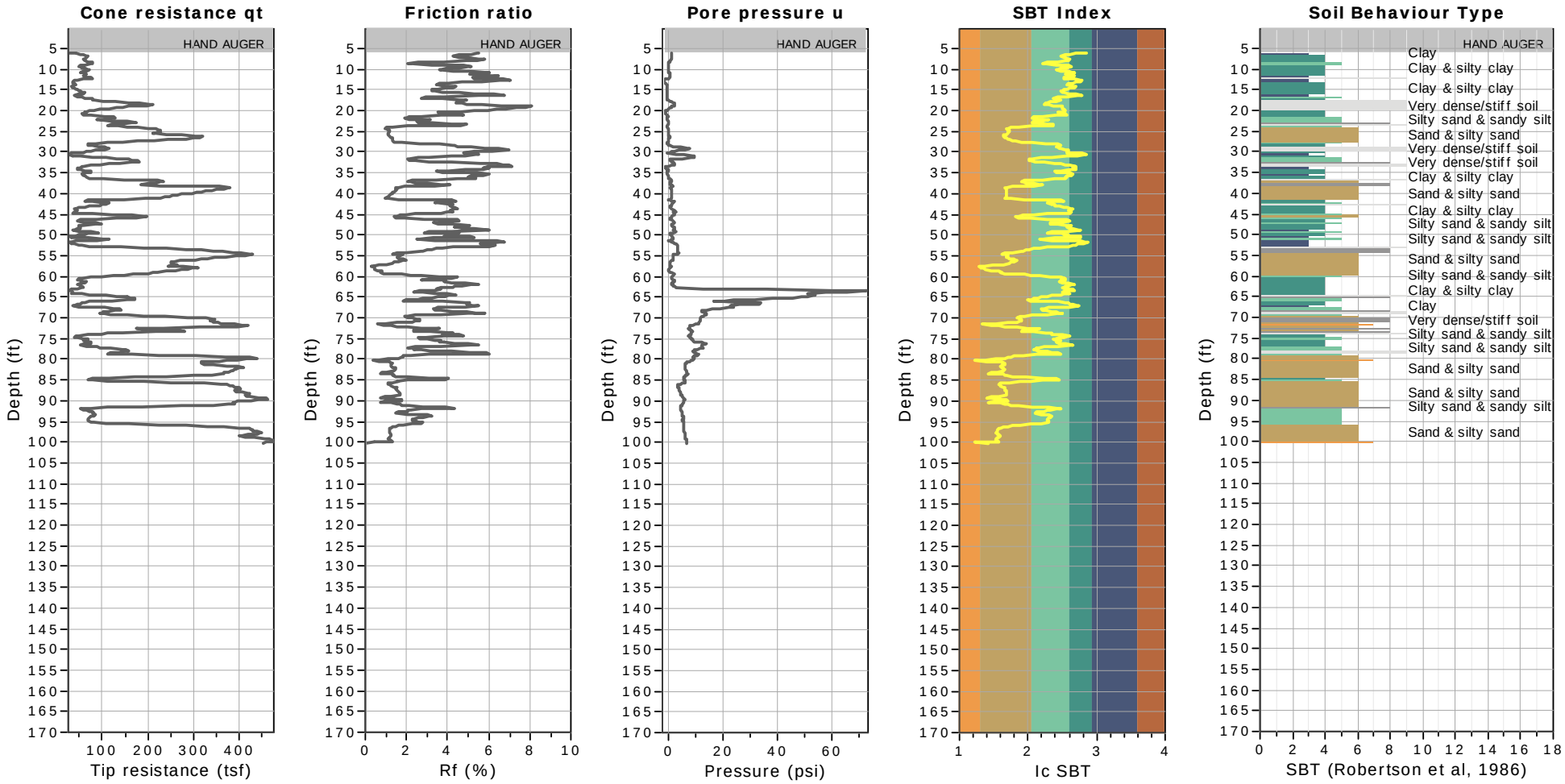
Location: Fresno-Bakersfield

CPT: S0267CPT

Total depth: 100.23 ft

Surface Elevation: 304.36 ft

Coords: X:6165898.73, Y:2426390.03



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0267CPT

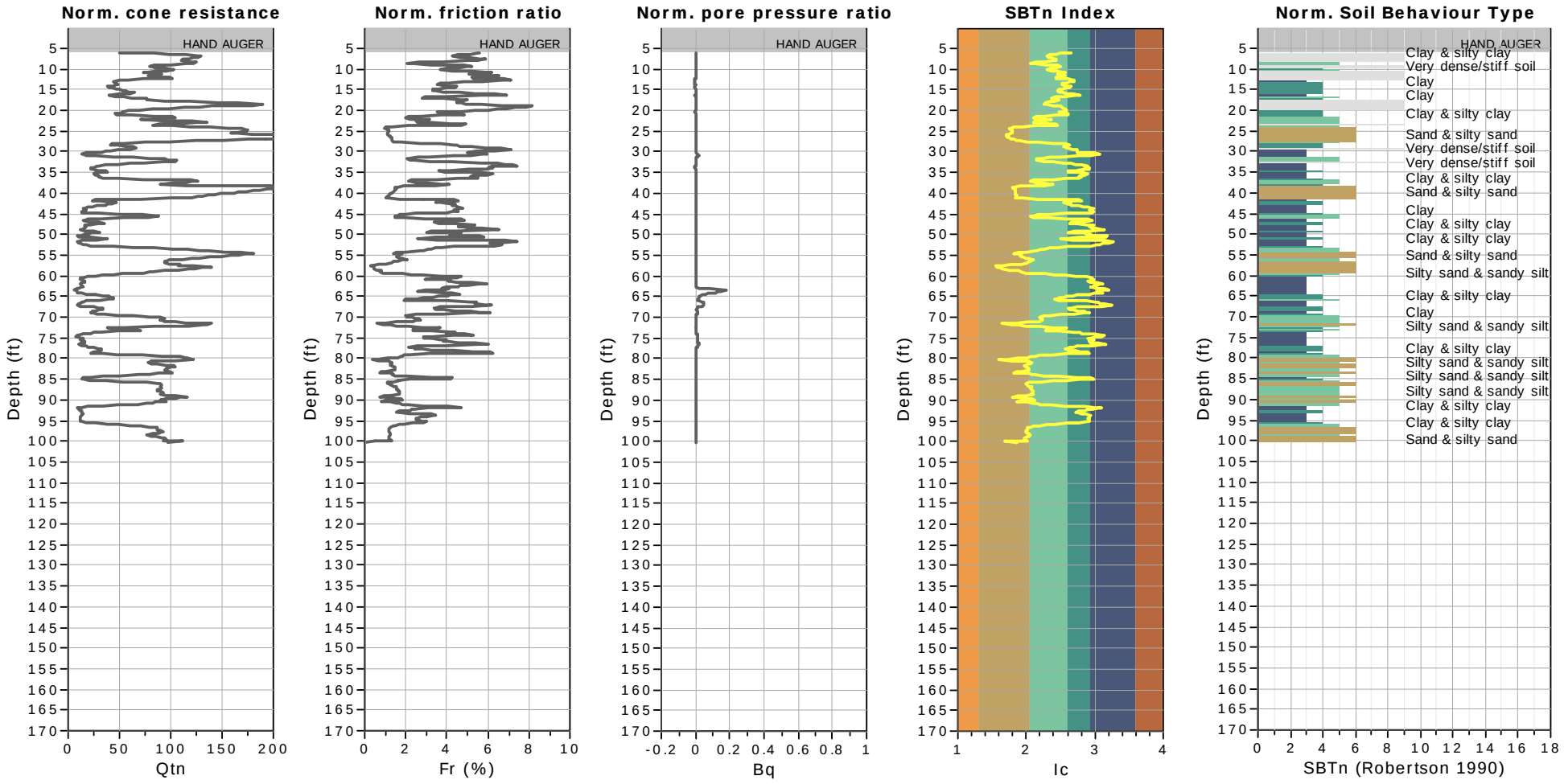
Total depth: 100.23 ft

Surface Elevation: 304.36 ft

Coords: X:6165898.73, Y:2426390.03

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

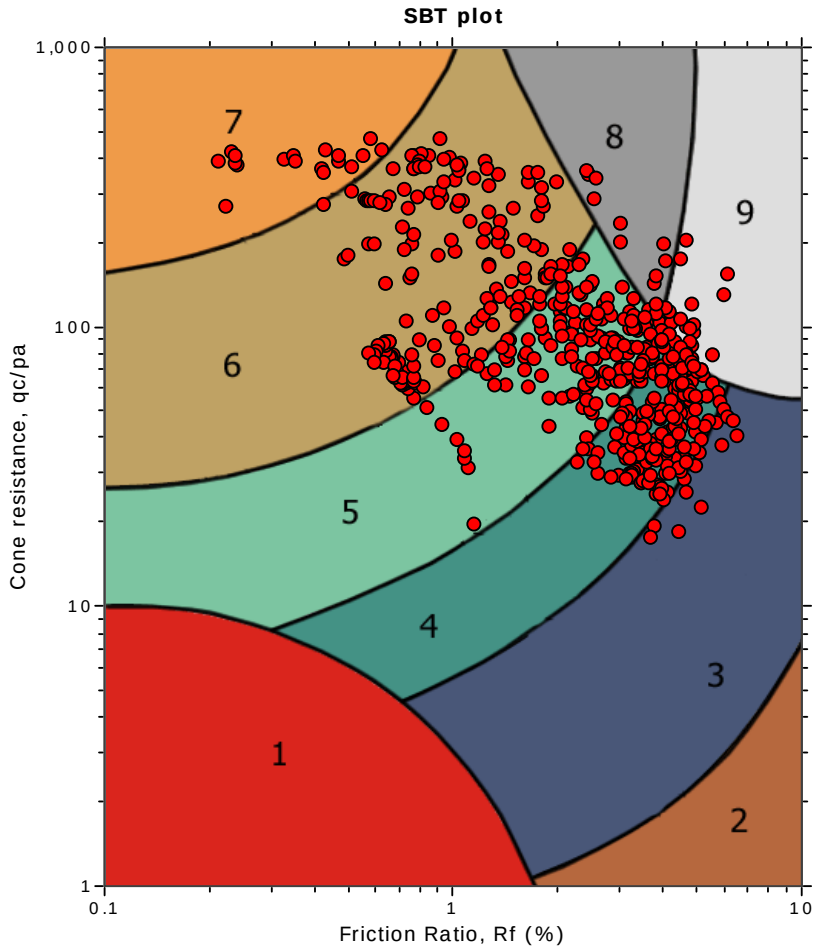
SBTn legend

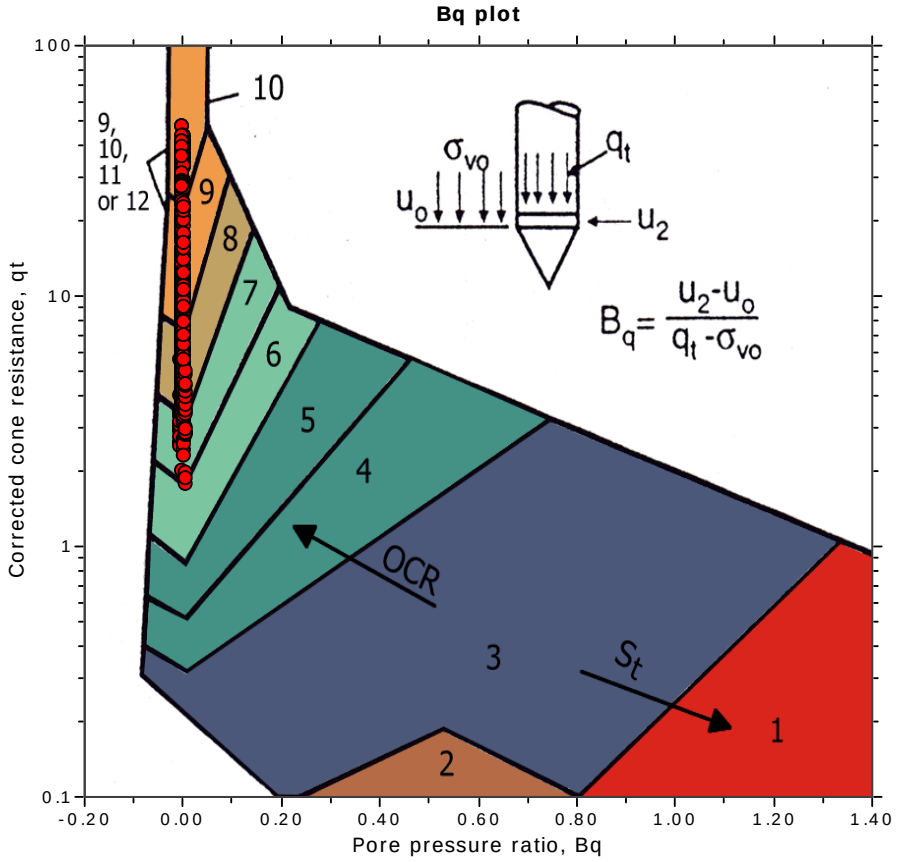
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0268ACPT
Total depth: 100.07 ft
Surface Elevation: 310.07 ft
Coords: X:6166194.49, Y:2423817.27

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0268ACPT

Total depth: 100.07 ft

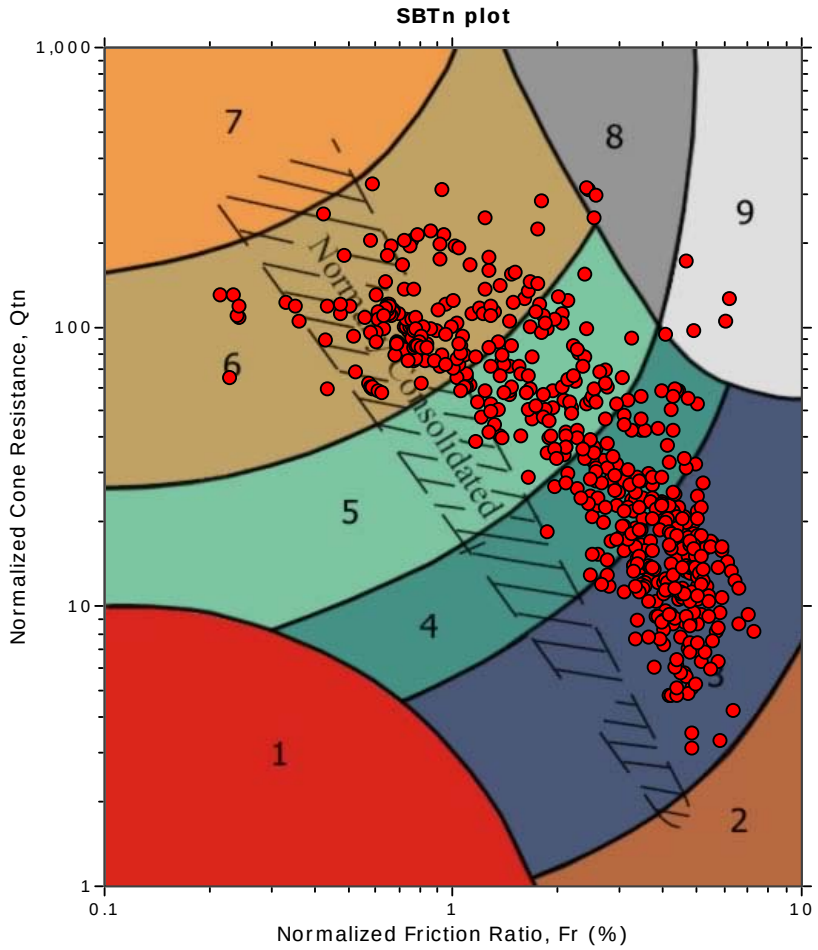
Surface Elevation: 310.07 ft

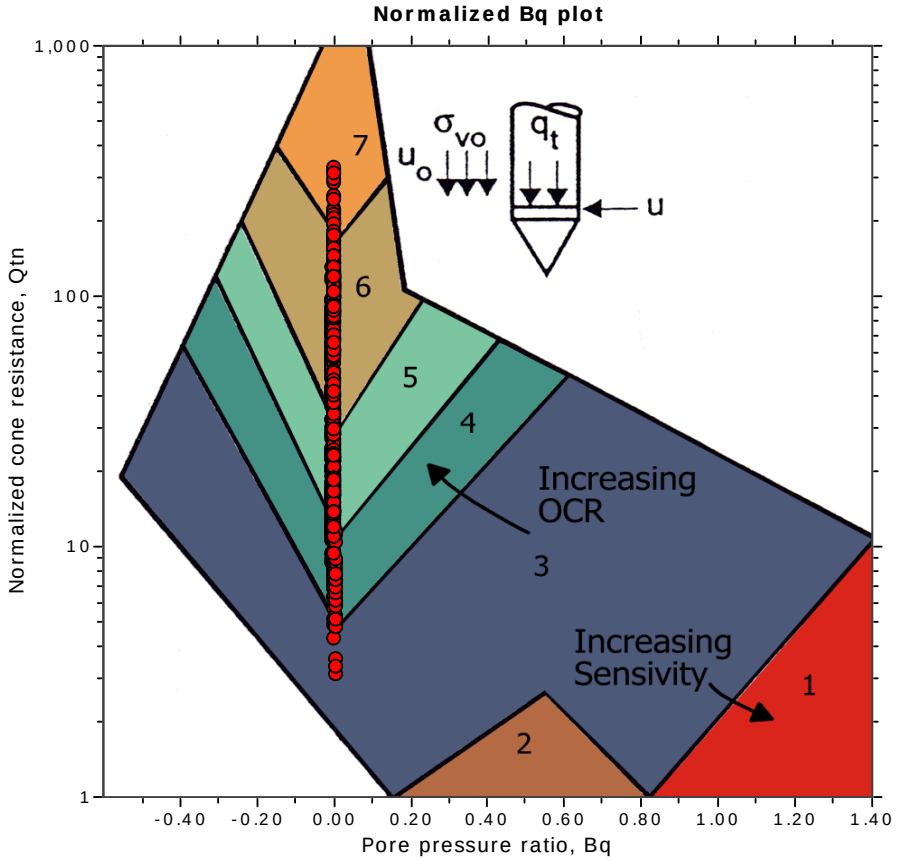
Coords: X:6166194.49, Y:2423817.27

Project: California High-Speed Train

Location: Fresno-Bakersfield

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0268ACPT

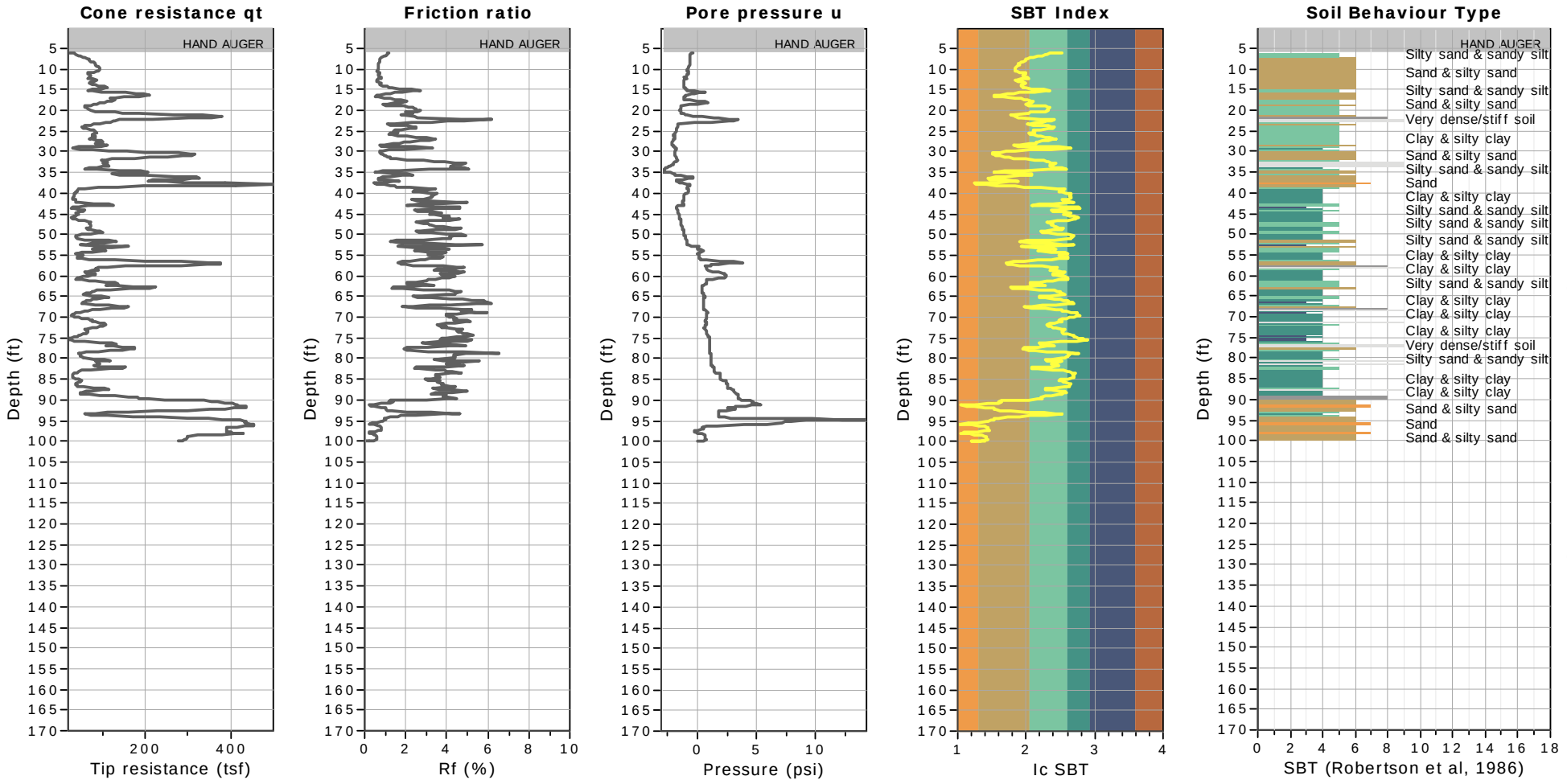
Total depth: 100.07 ft

Surface Elevation: 310.07 ft

Coords: X:6166194.49, Y:2423817.27

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0268ACPT

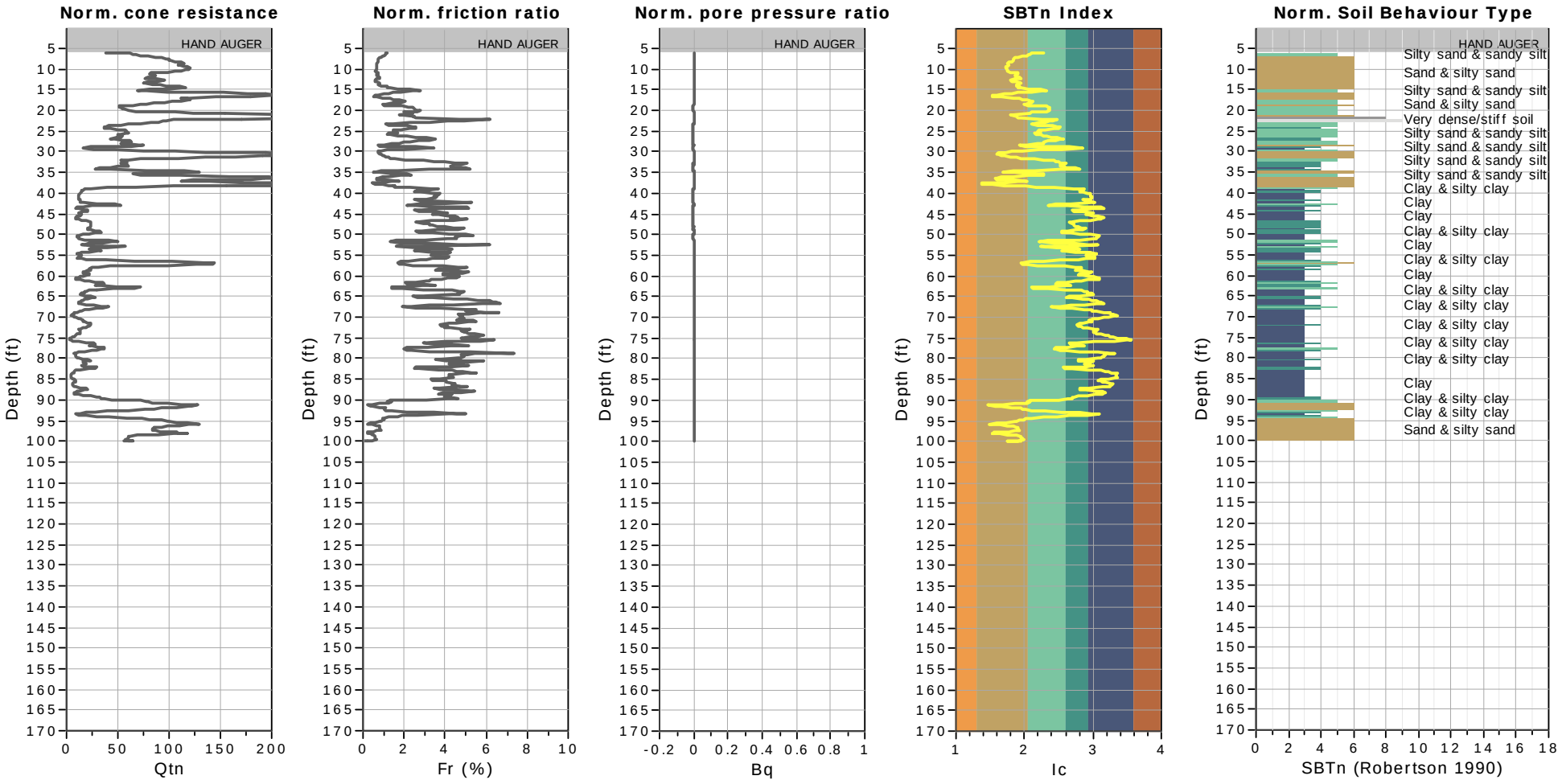
Total depth: 100.07 ft

Surface Elevation: 310.07 ft

Coords: X:6166194.49, Y:2423817.27

Project: California High-Speed Train

Location: Fresno-Bakersfield



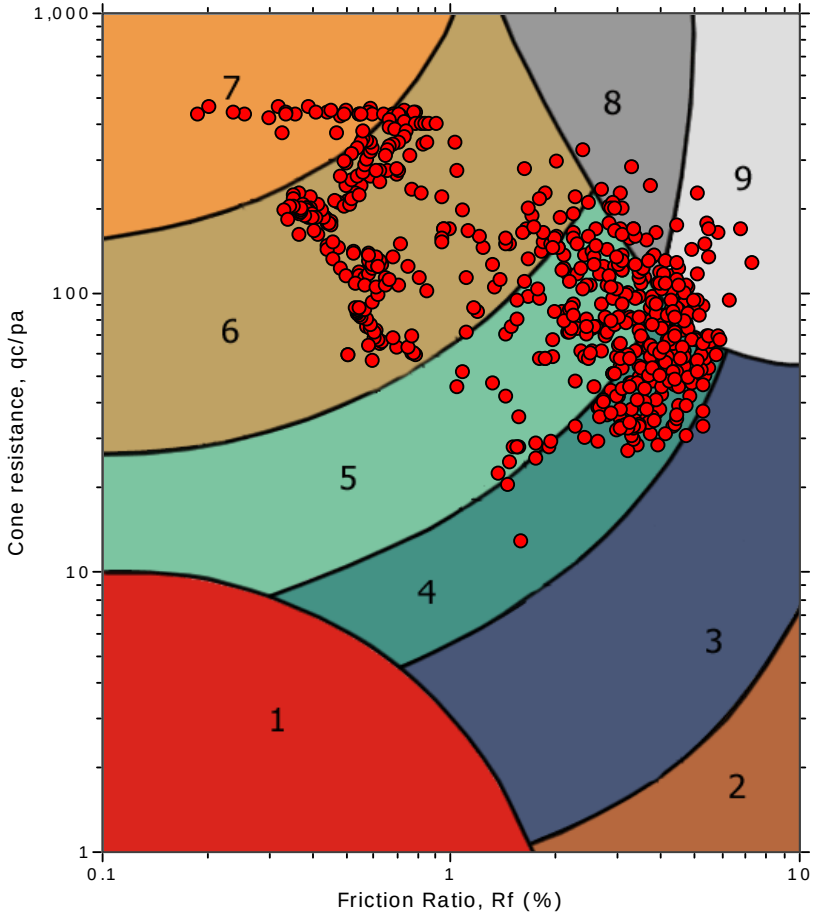
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

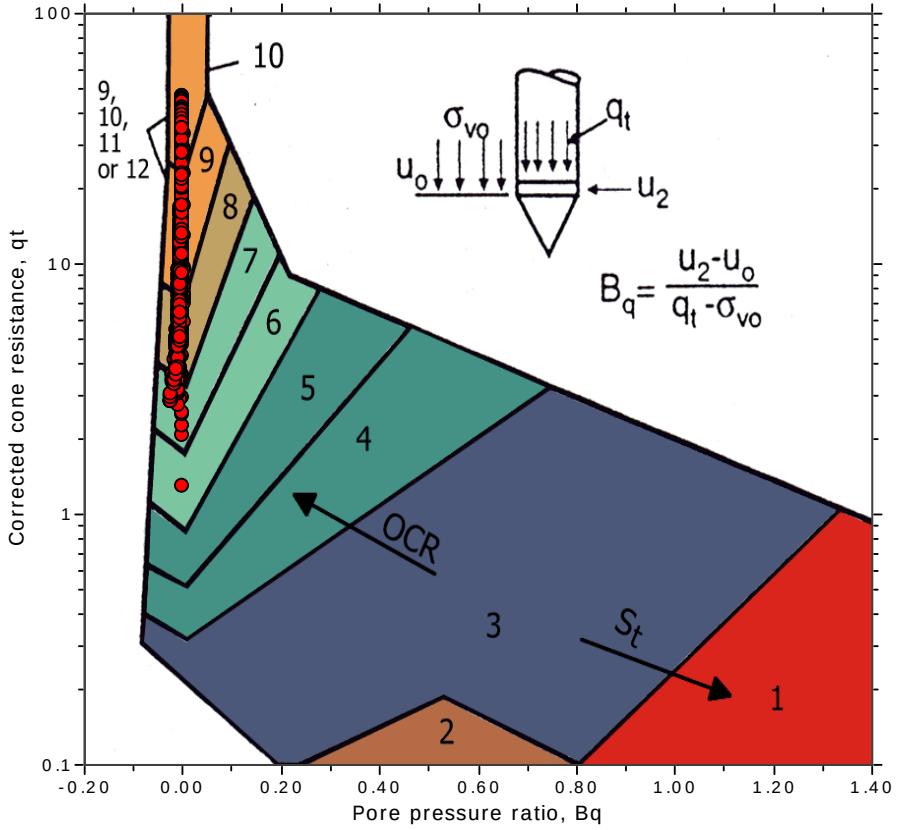
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots

SBT plot



Bq plot



SBT legend

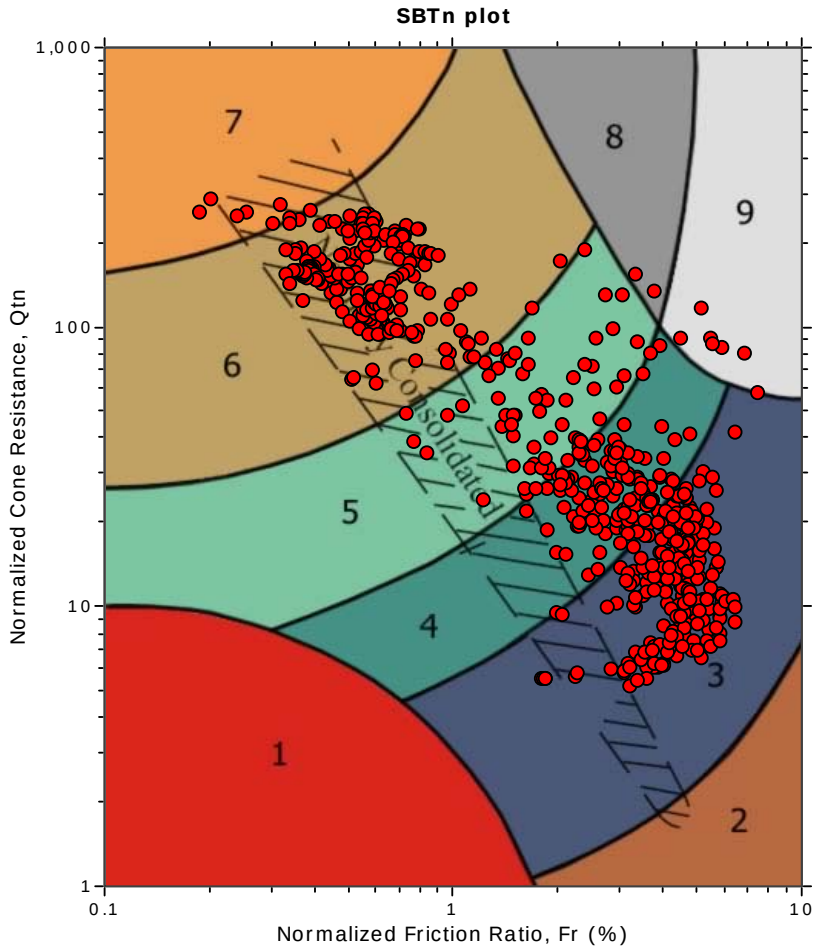
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

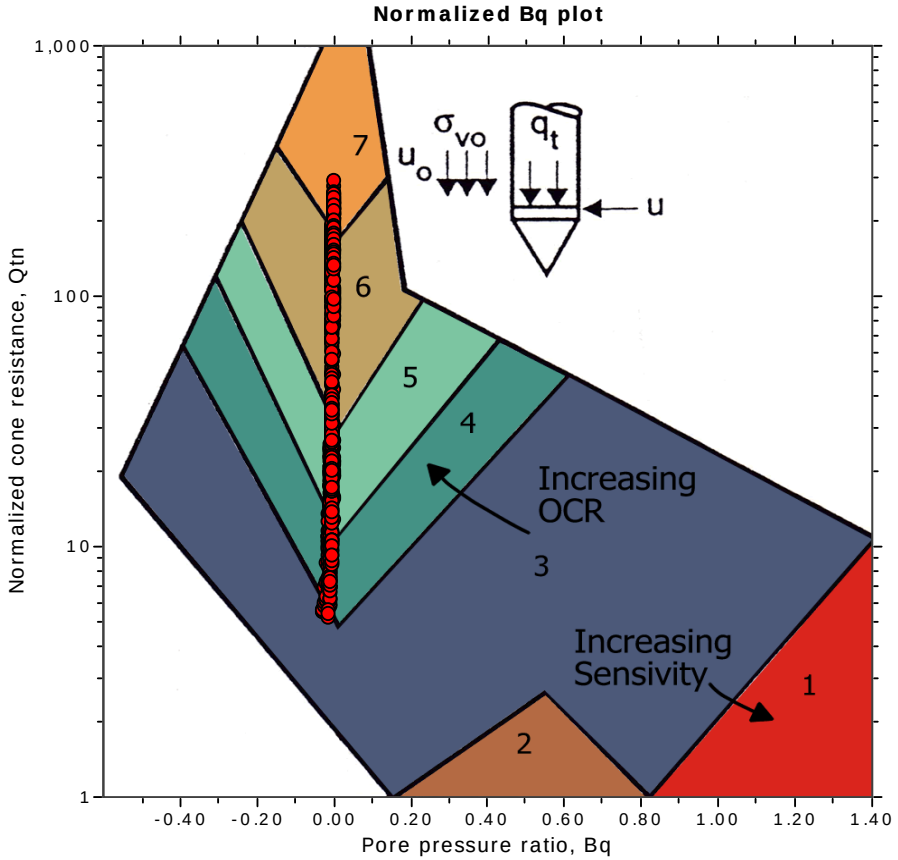
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0269CPT
Total depth: 110.07 ft
Surface Elevation: 312.64 ft
Coords: X:6166139.00, Y:2420973.21

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

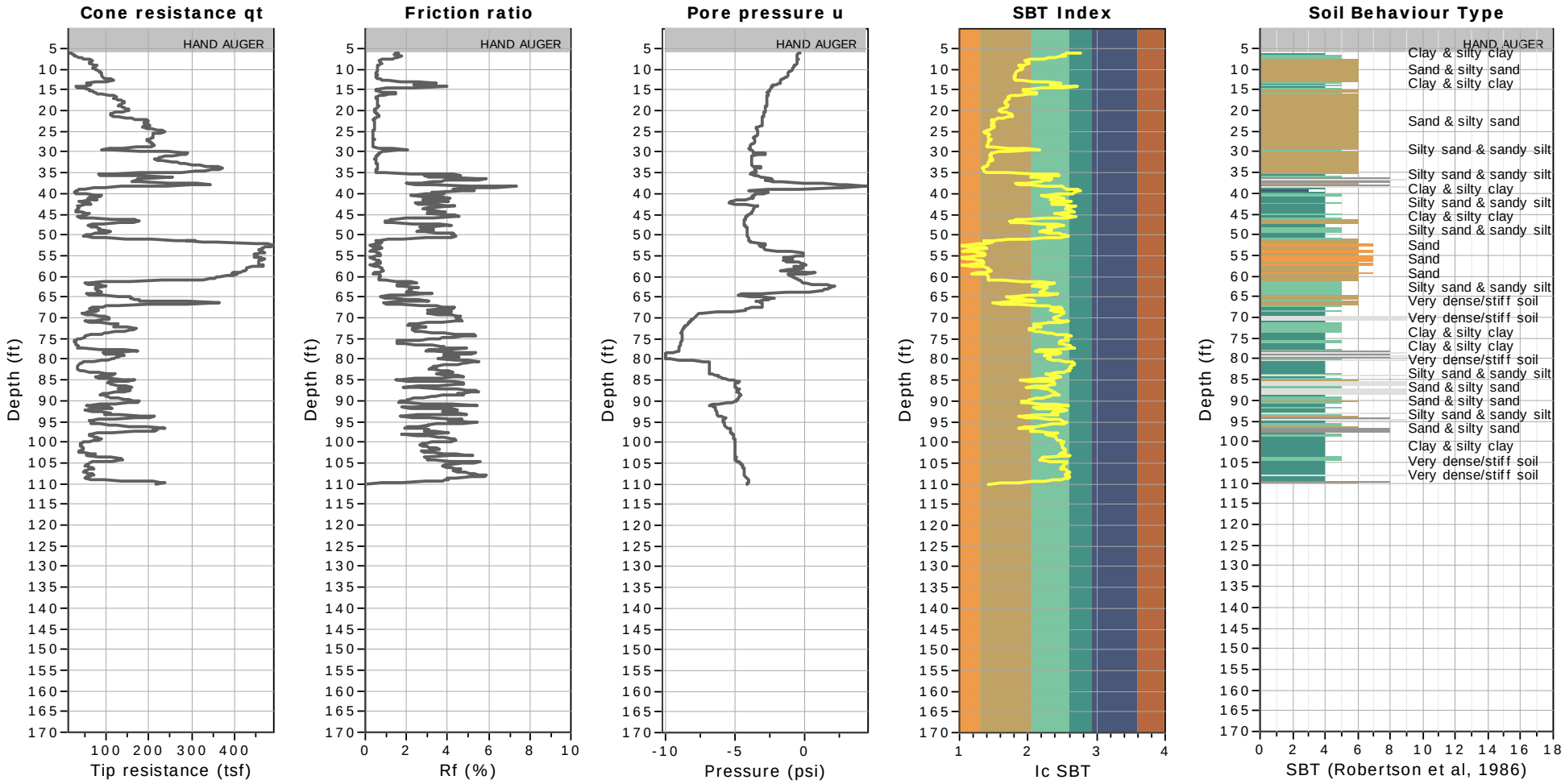
Location: Fresno-Bakersfield

CPT: S0269CPT

Total depth: 110.07 ft

Surface Elevation: 312.64 ft

Coords: X:6166139.00, Y:2420973.21



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0269CPT

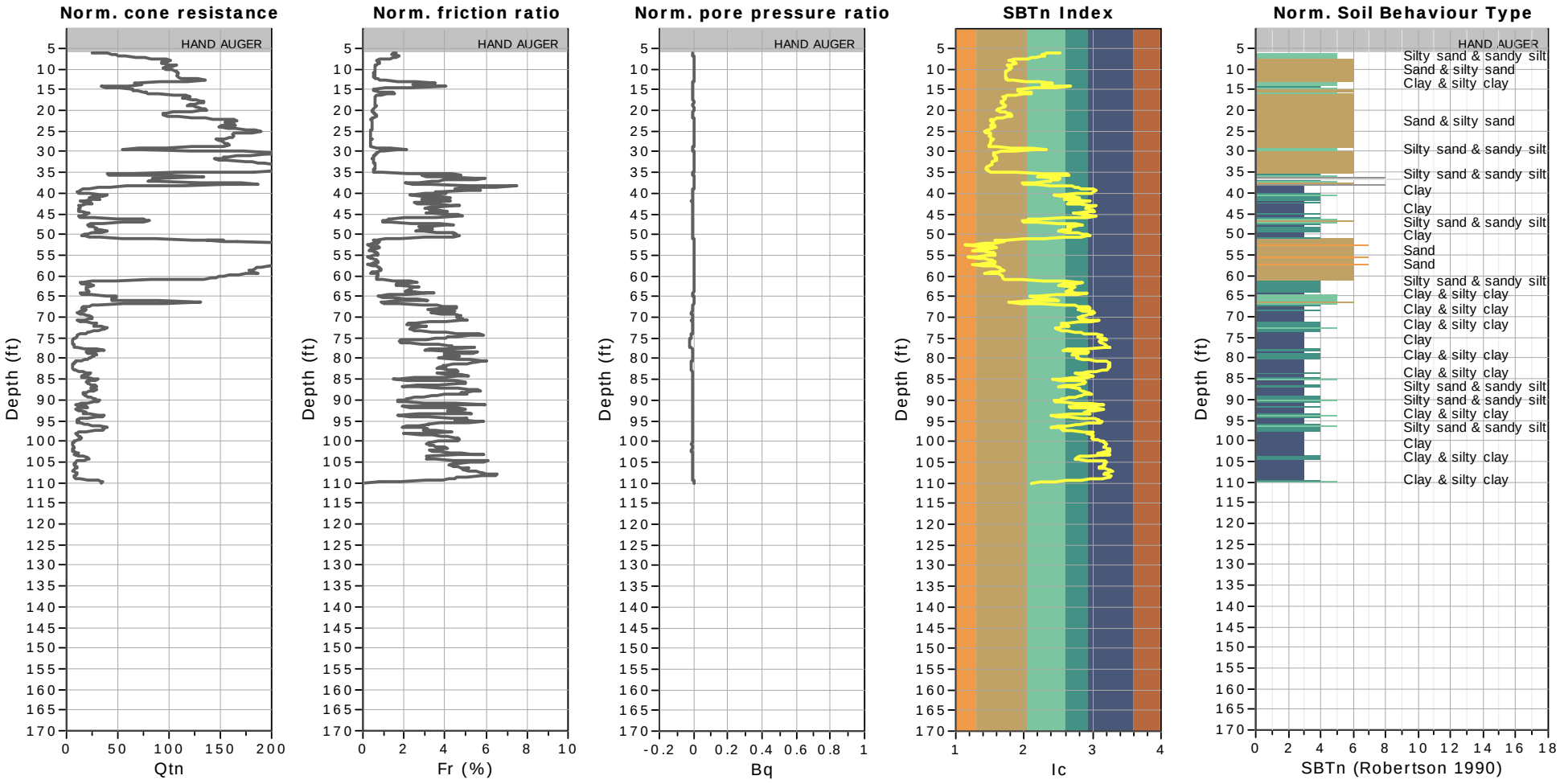
Total depth: 110.07 ft

Surface Elevation: 312.64 ft

Coords: X:6166139.00, Y:2420973.21

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

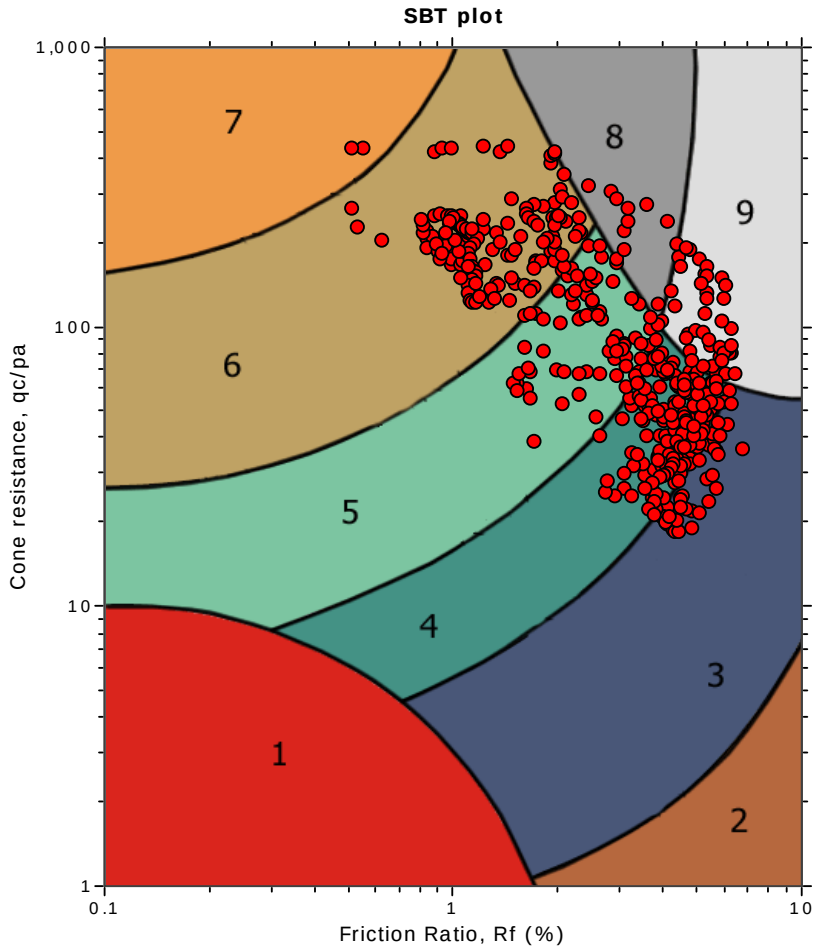
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

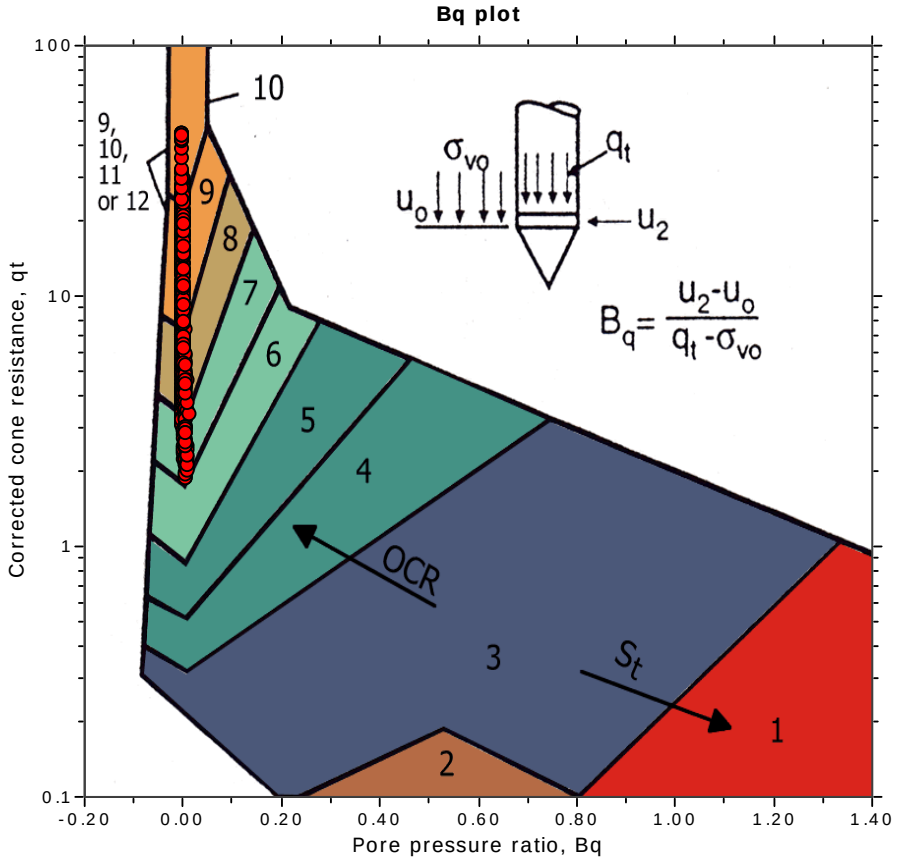
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0270CPT
Total depth: 85.14 ft
Surface Elevation: 310.24 ft
Coords: X:6166239.07, Y:2425141.87

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

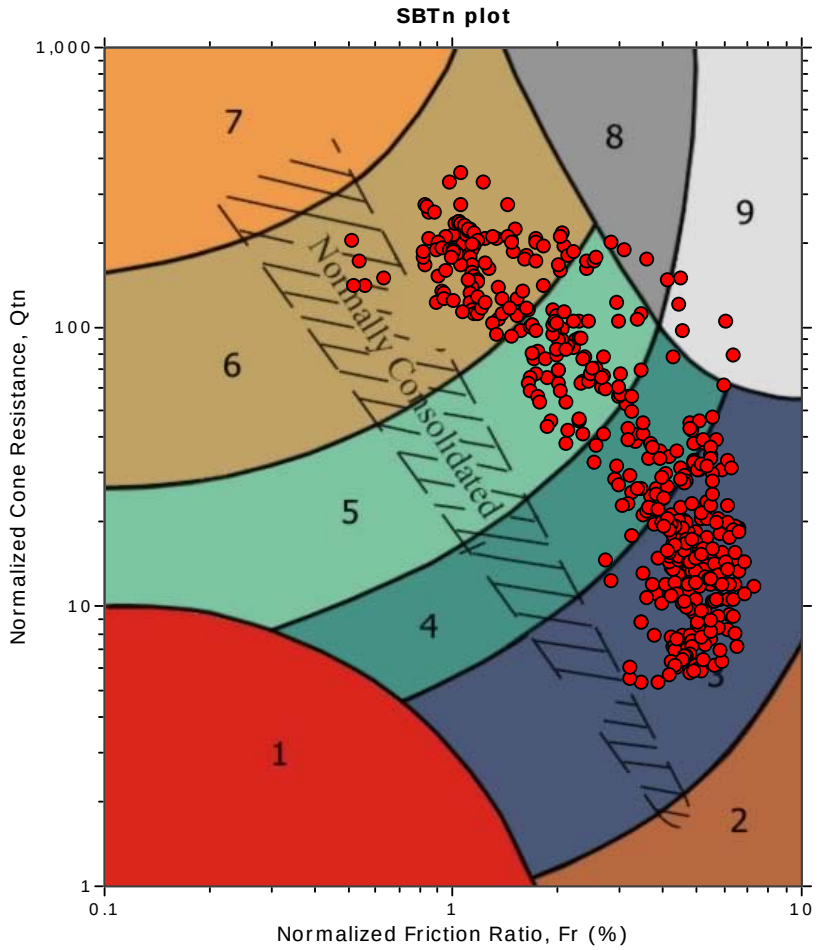
CPT: S0270CPT

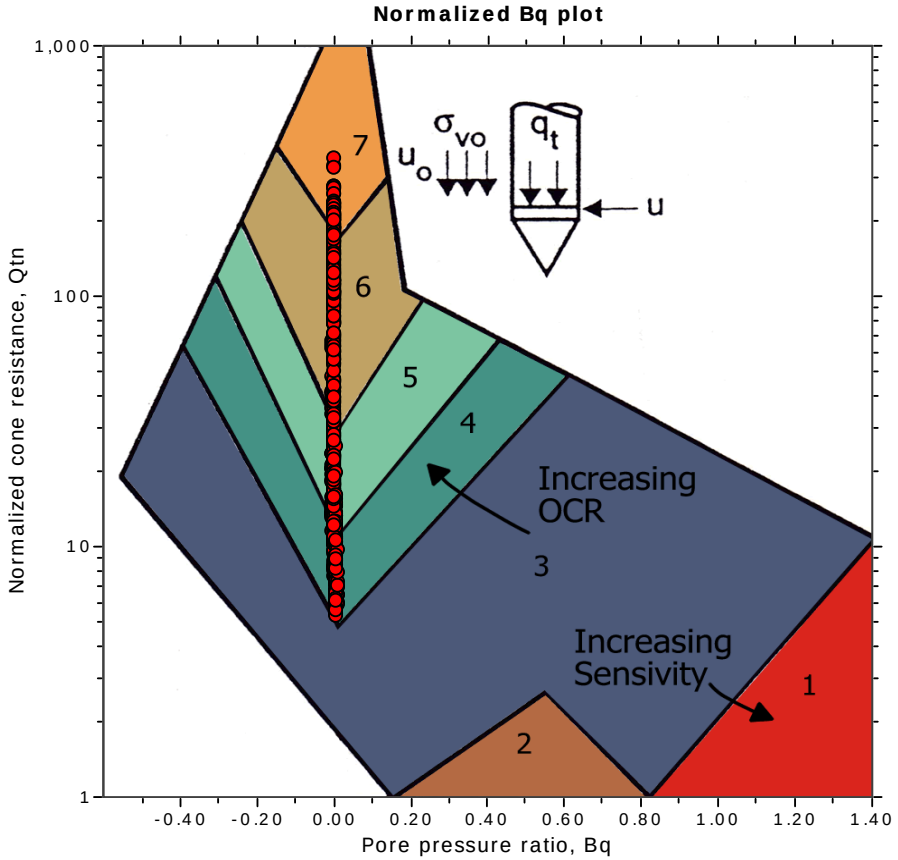
Total depth: 85.14 ft

Surface Elevation: 310.24 ft

Coords: X:6166239.07, Y:2425141.87

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0270CPT

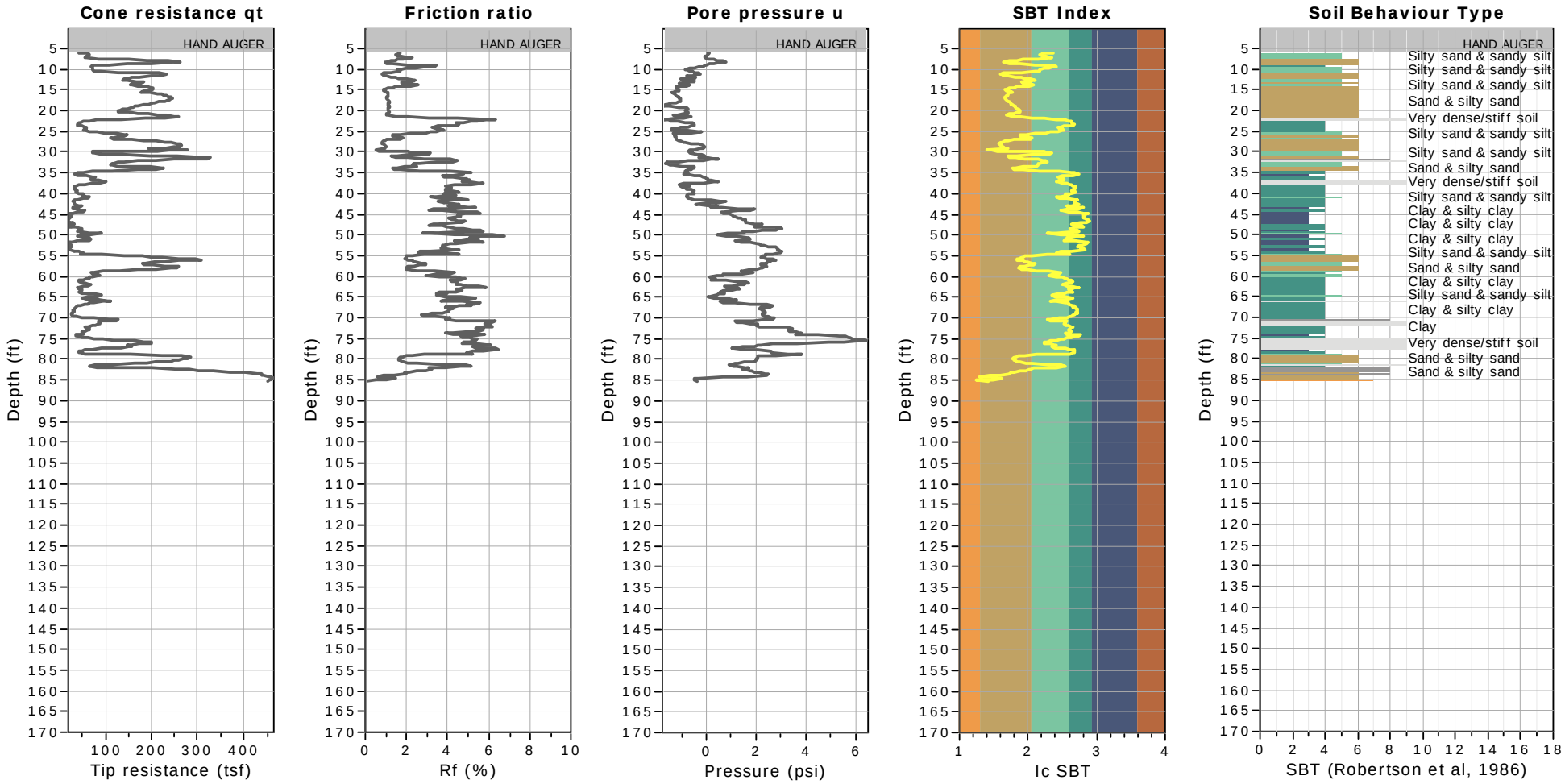
Total depth: 85.14 ft

Surface Elevation: 310.24 ft

Coords: X:6166239.07, Y:2425141.87

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0270CPT

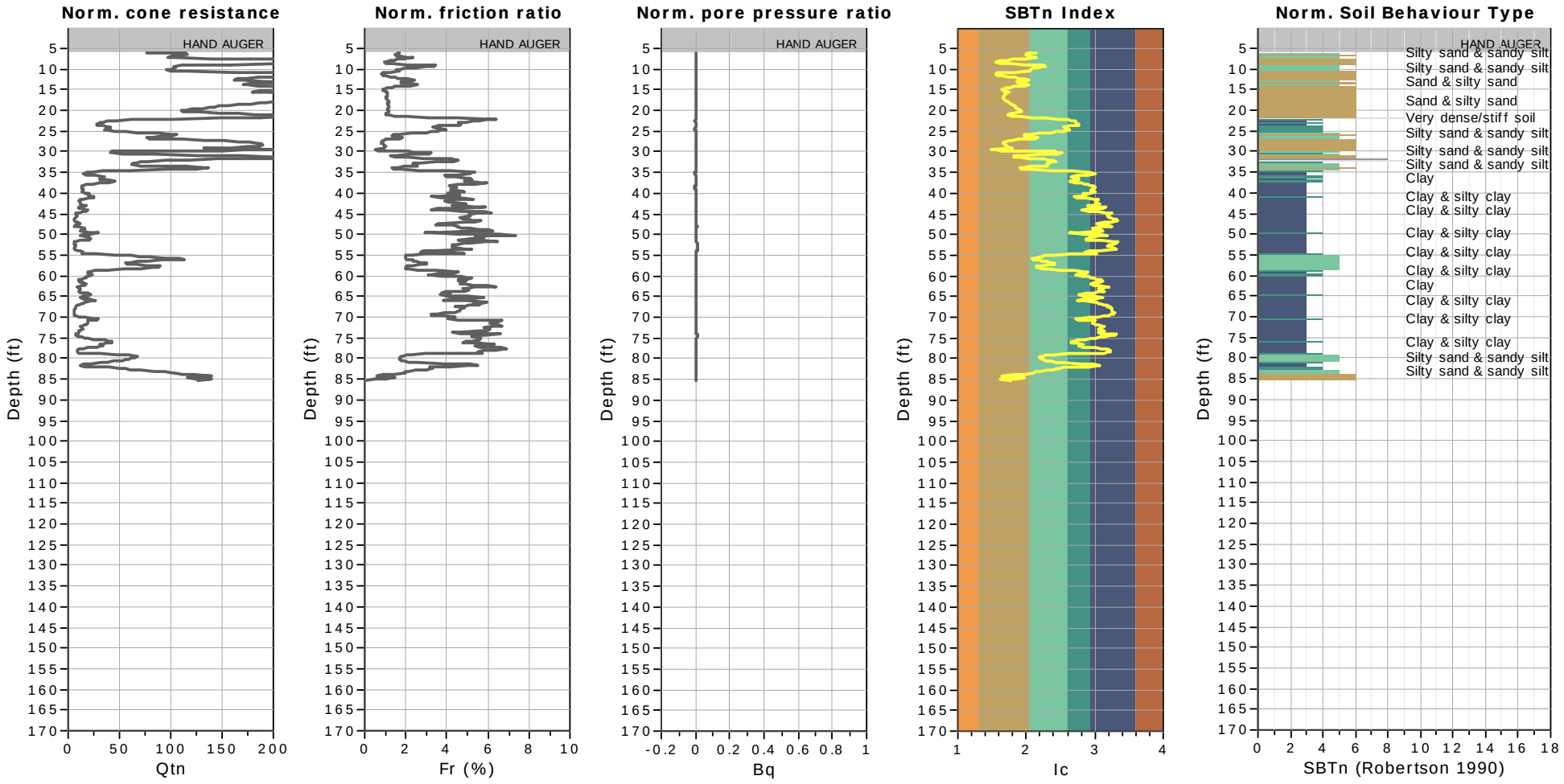
Total depth: 85.14 ft

Surface Elevation: 310.24 ft

Coords: X:6166239.07, Y:2425141.87

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

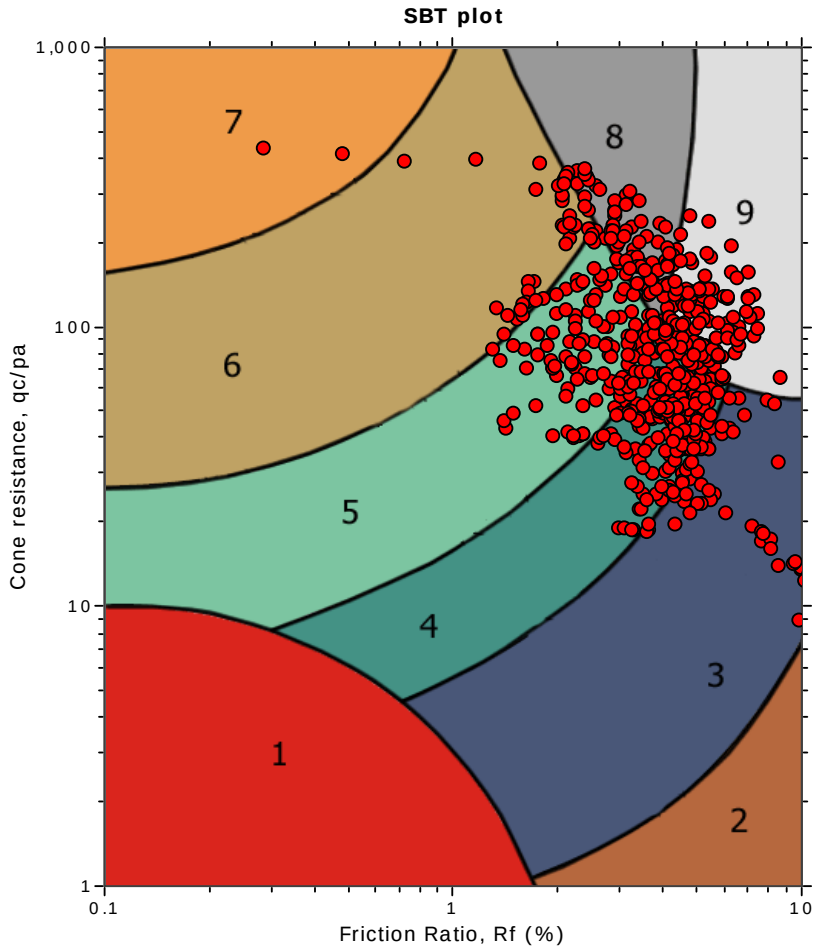
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

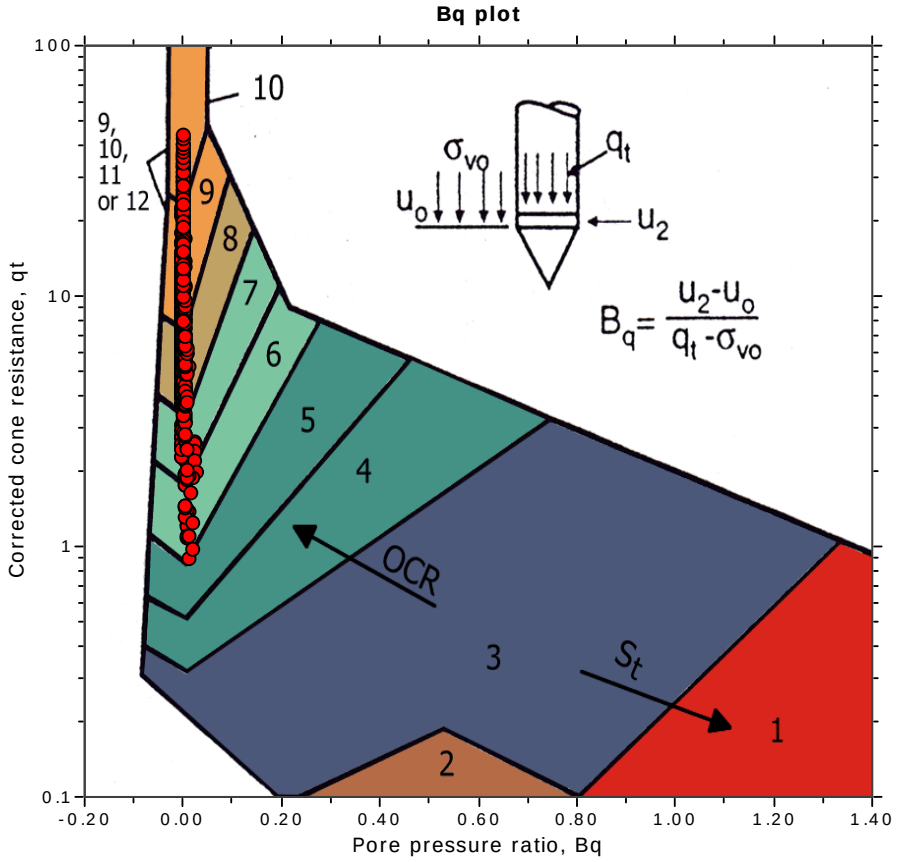
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0271CPT
Total depth: 100.89 ft
Surface Elevation: 317.64 ft
Coords: X:6166084.92, Y:2418528.15

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

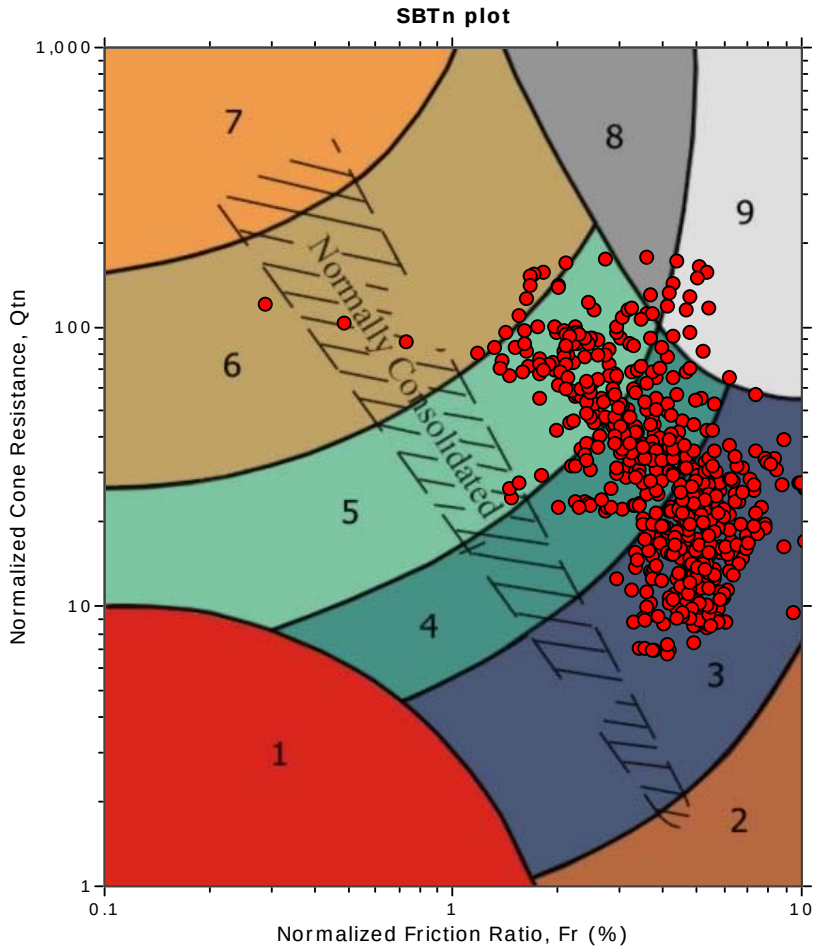
CPT: S0271CPT

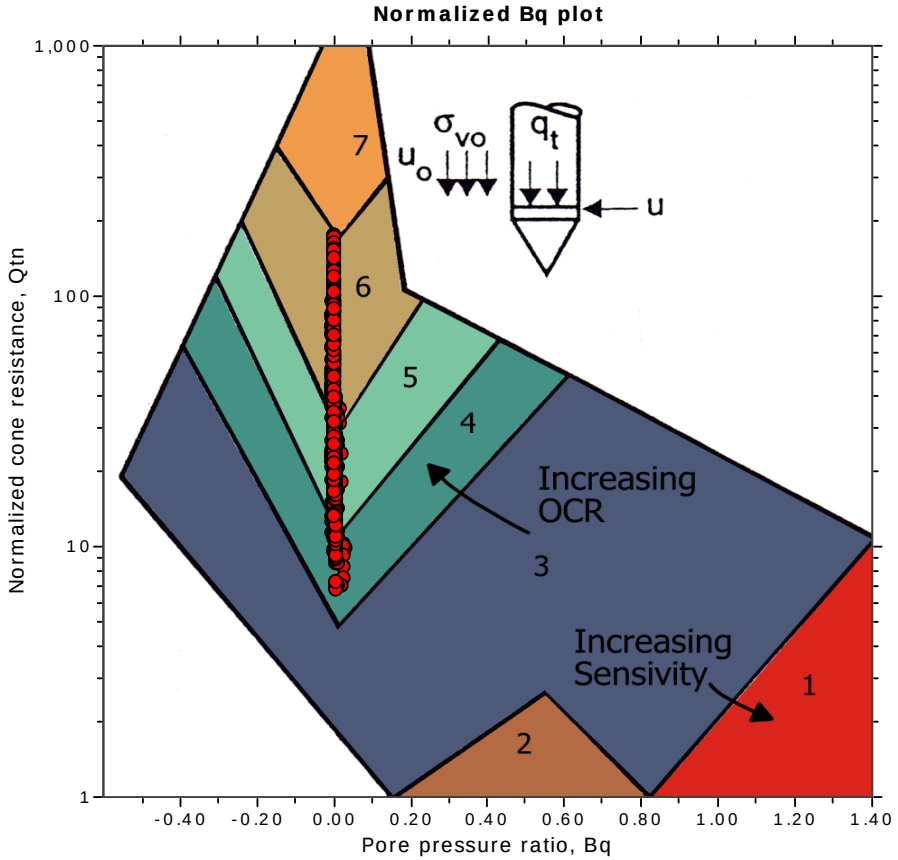
Total depth: 100.89 ft

Surface Elevation: 317.64 ft

Coords: X:6166084.92, Y:2418528.15

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0271CPT

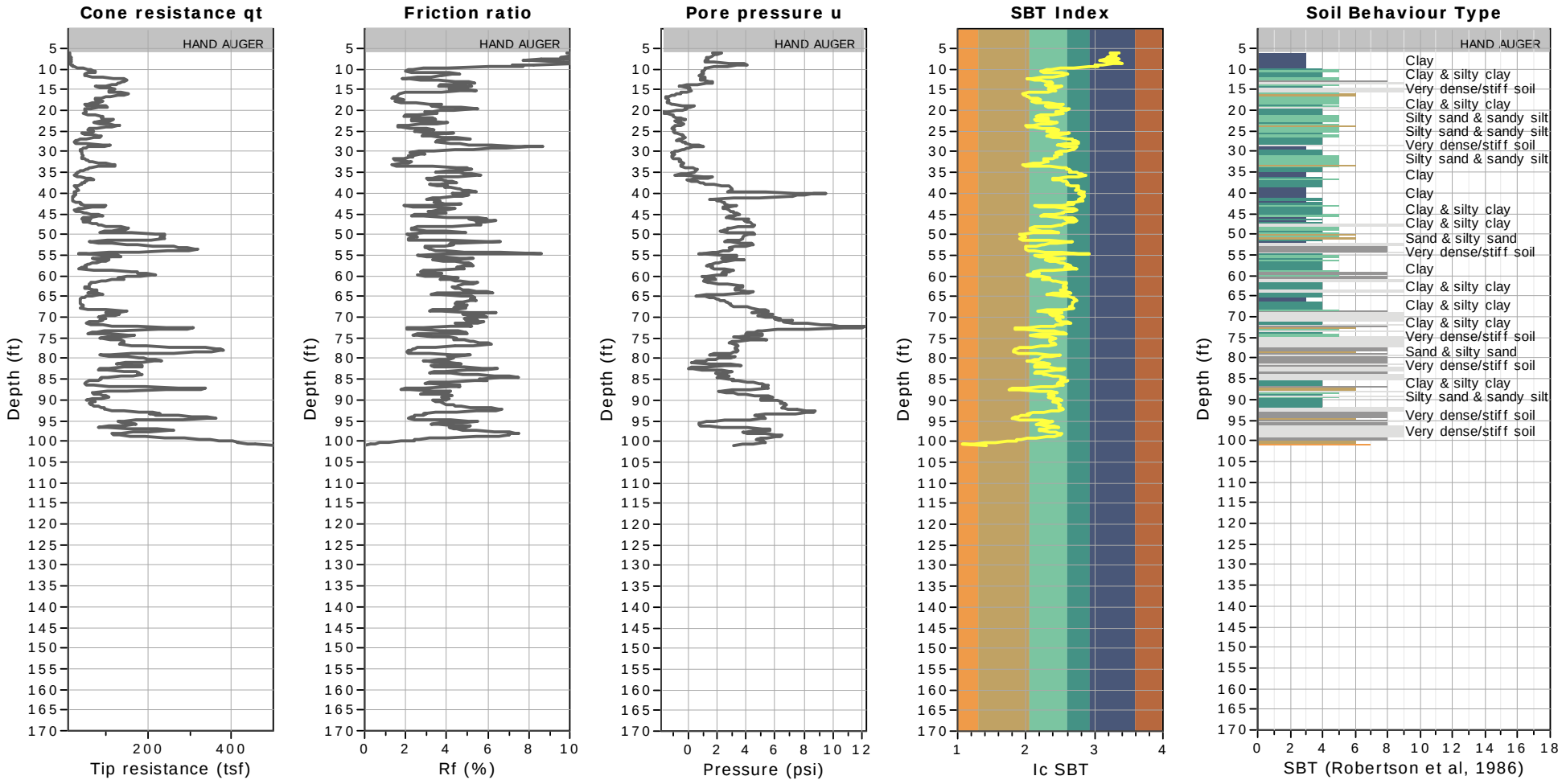
Total depth: 100.89 ft

Surface Elevation: 317.64 ft

Coords: X:6166084.92, Y:2418528.15

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0271CPT

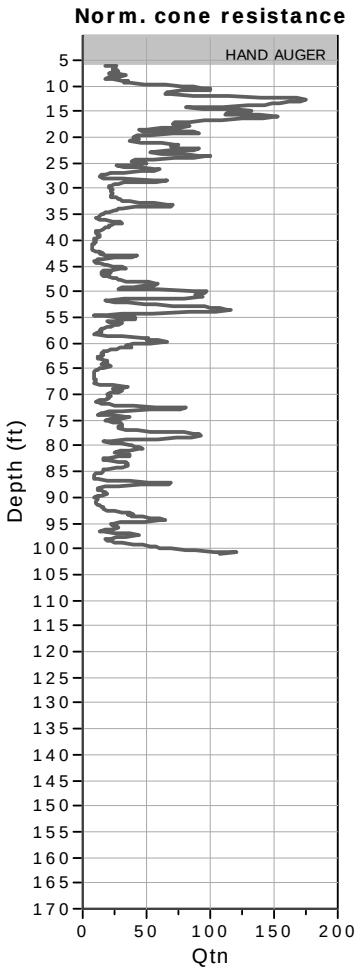
Total depth: 100.89 ft

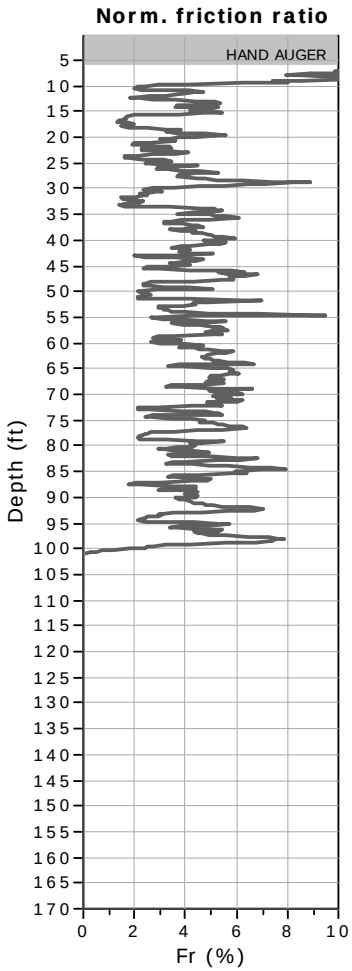
Surface Elevation: 317.64 ft

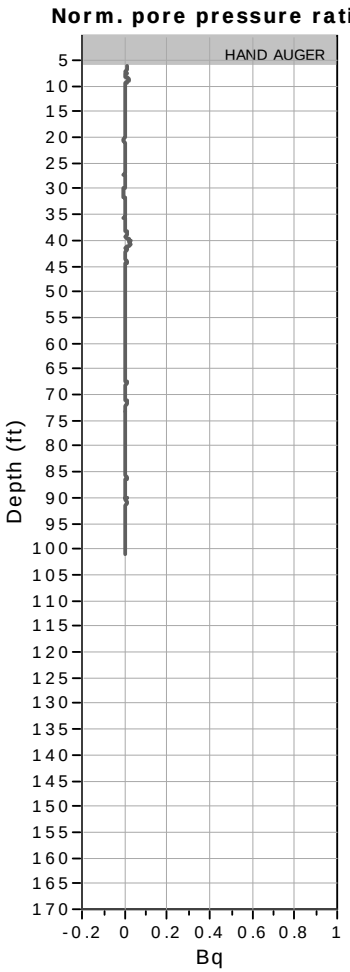
Coords: X:6166084.92, Y:2418528.15

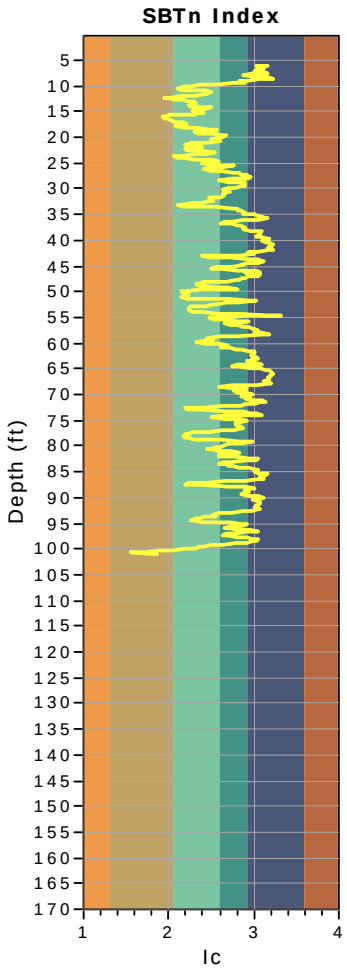
Project: California High-Speed Train

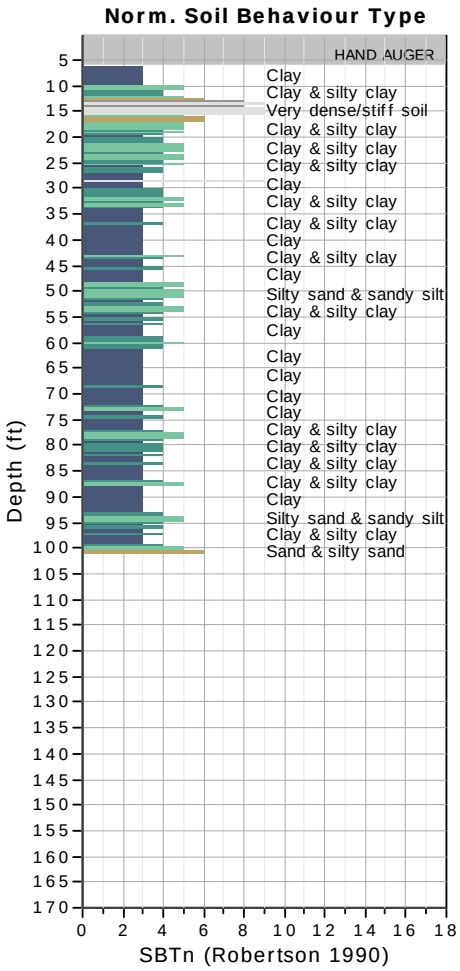
Location: Fresno-Bakersfield









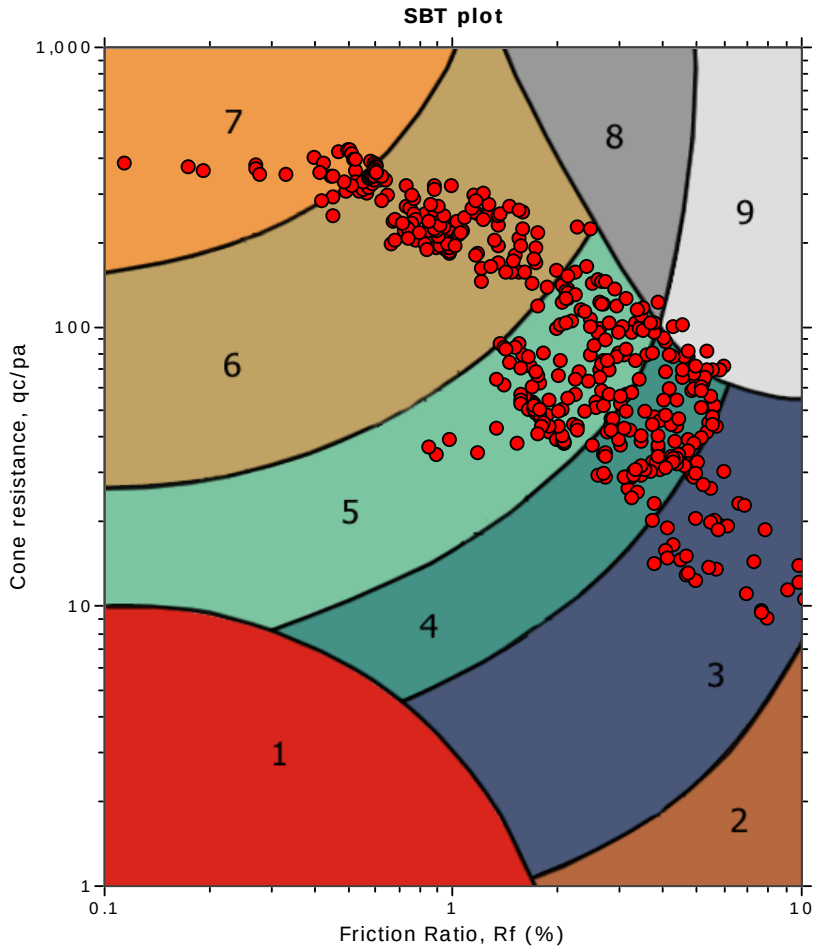


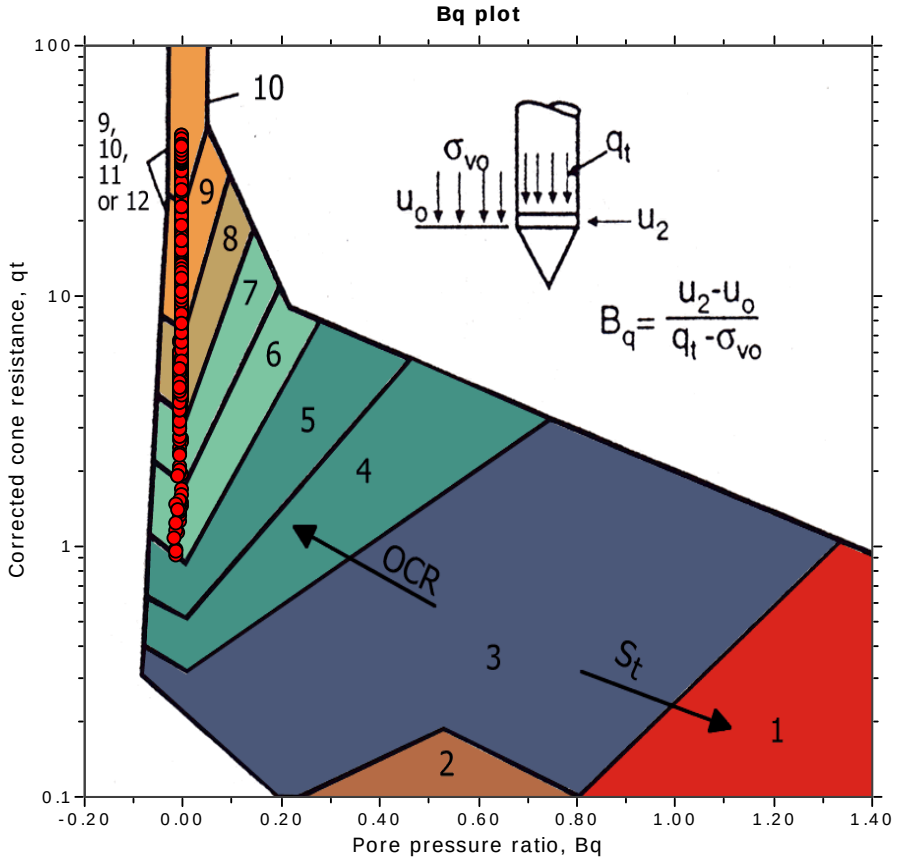
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



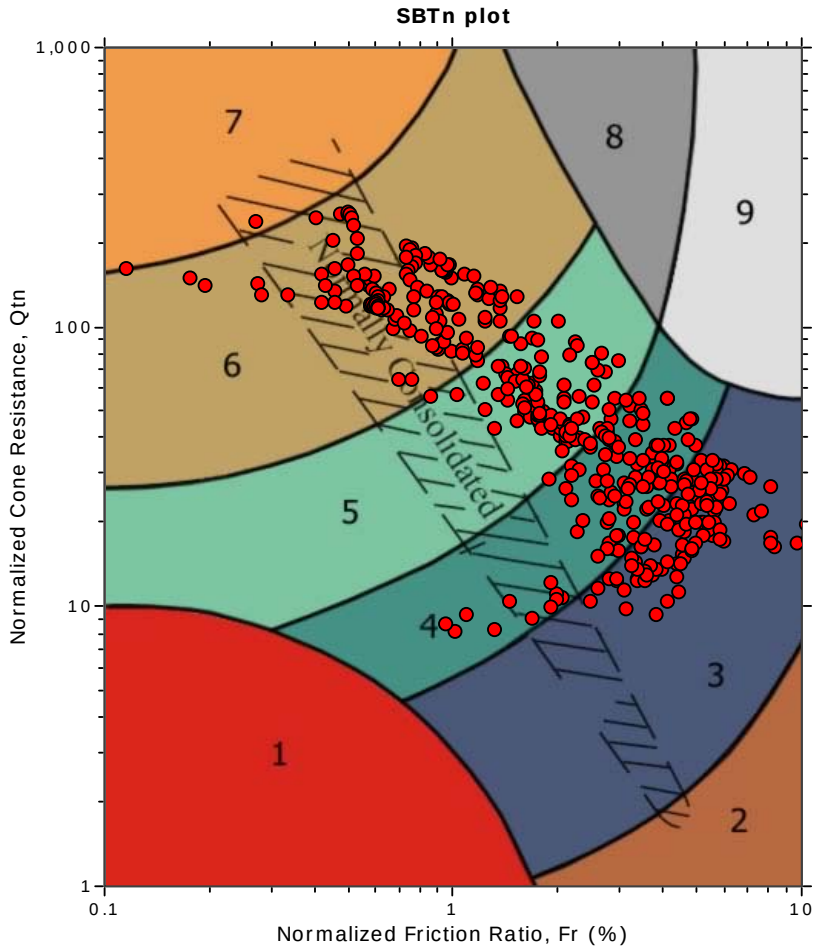


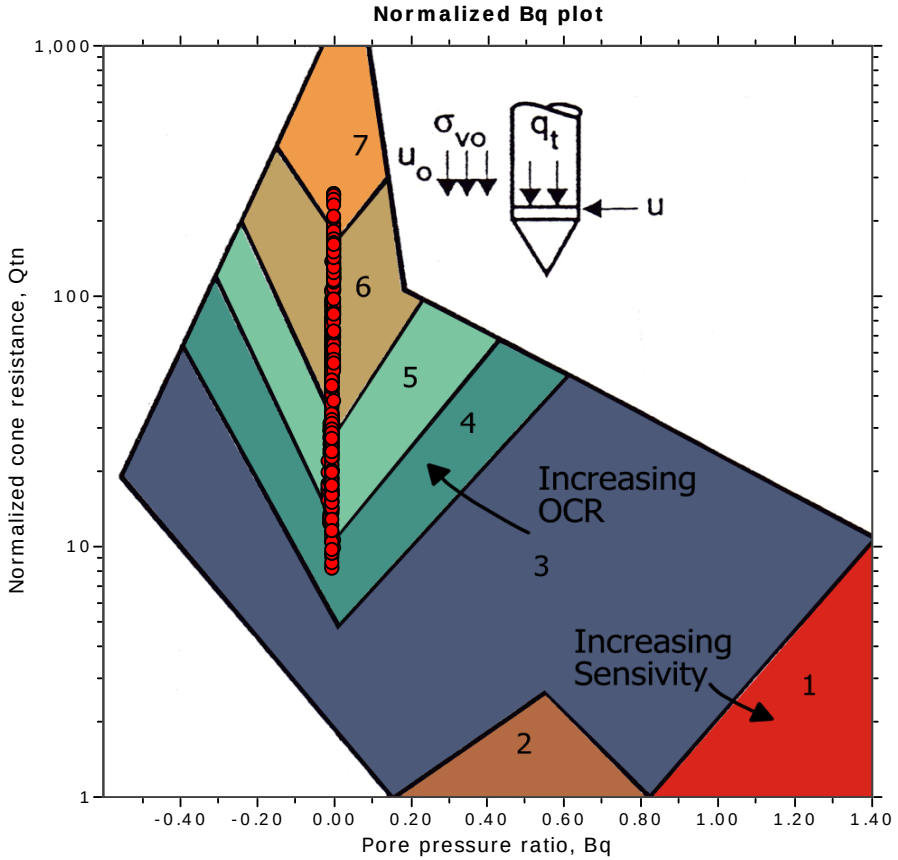
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

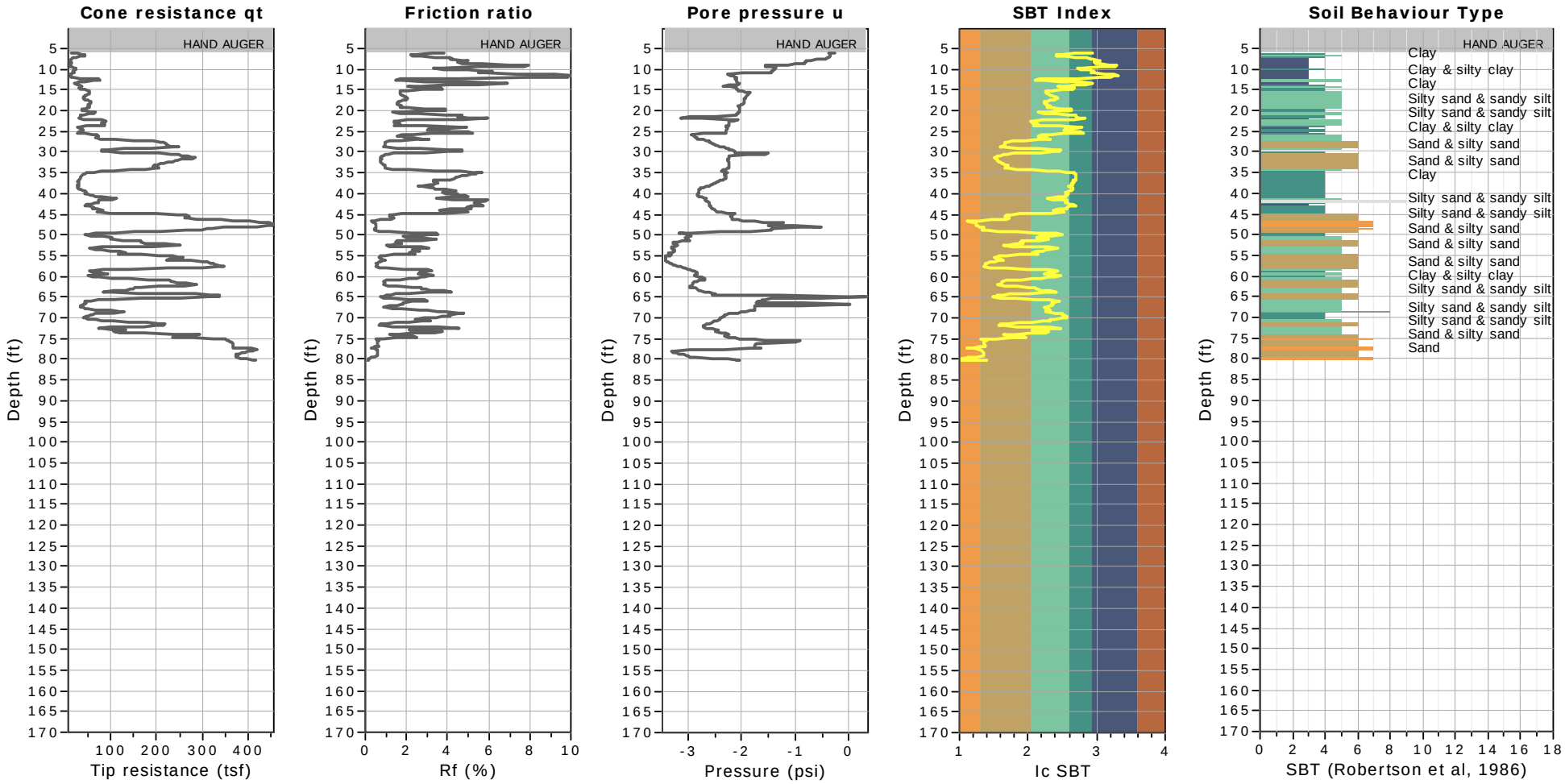
Location: Fresno-Bakersfield

CPT: S0272CPT

Total depth: 80.22 ft

Surface Elevation: 320.64 ft

Coords: X:6166038.29, Y:2415725.14



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0272CPT

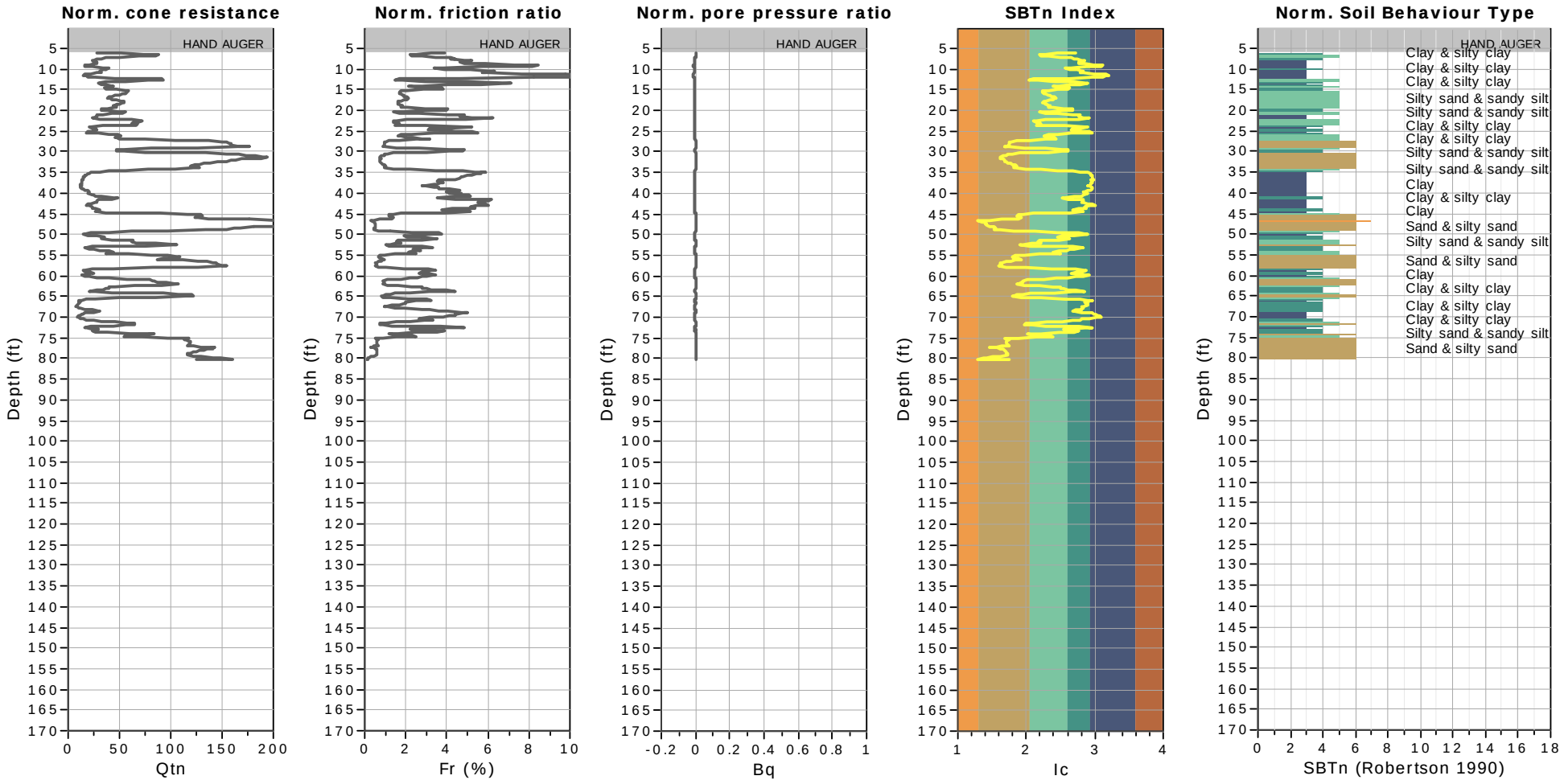
Total depth: 80.22 ft

Surface Elevation: 320.64 ft

Coords: X:6166038.29, Y:2415725.14

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

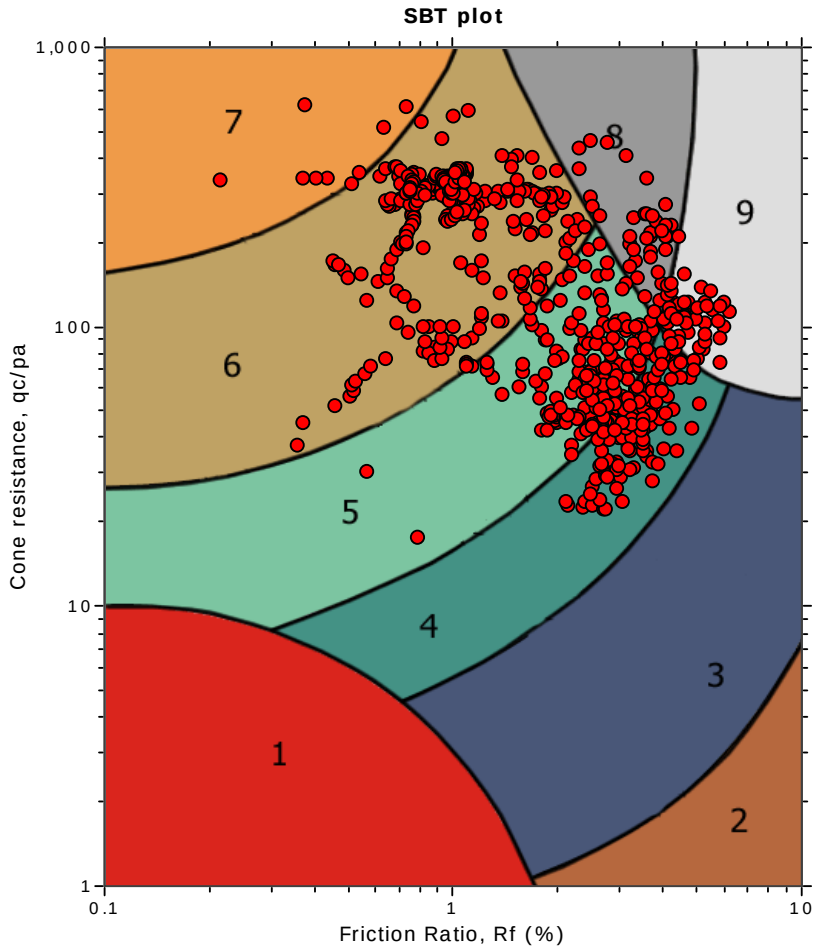
SBTn legend

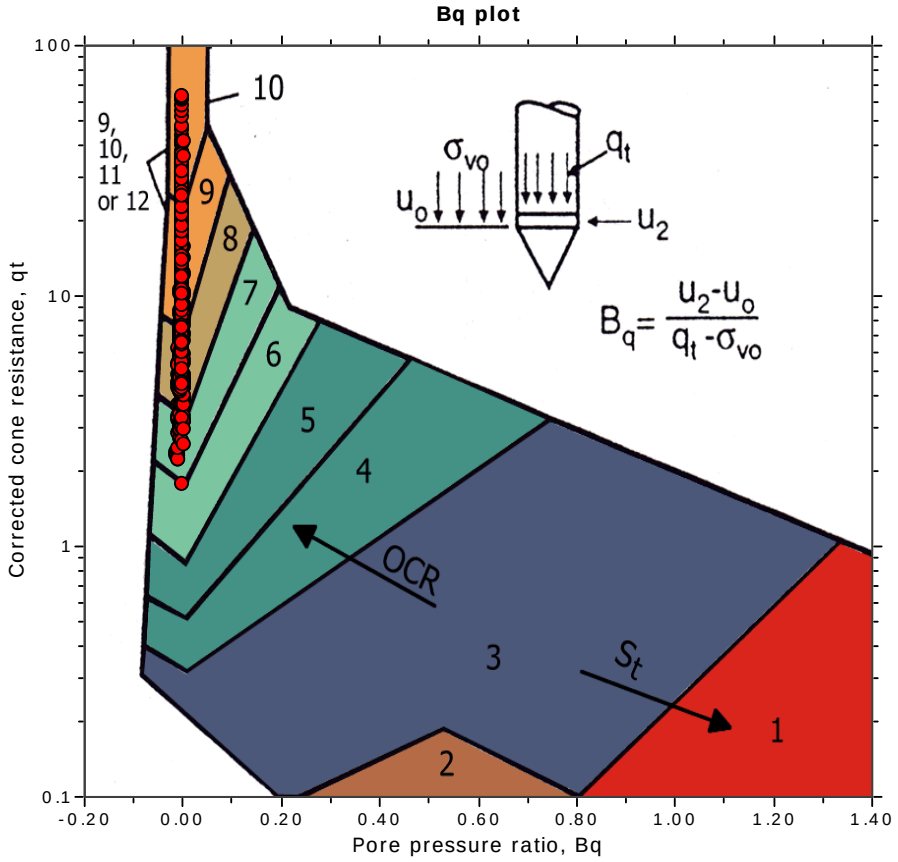
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0273CPT
Total depth: 118.44 ft
Surface Elevation: 320.76 ft
Coords: X:6165999.08, Y:2413729.88

SBT - Bq plots





SBT legend

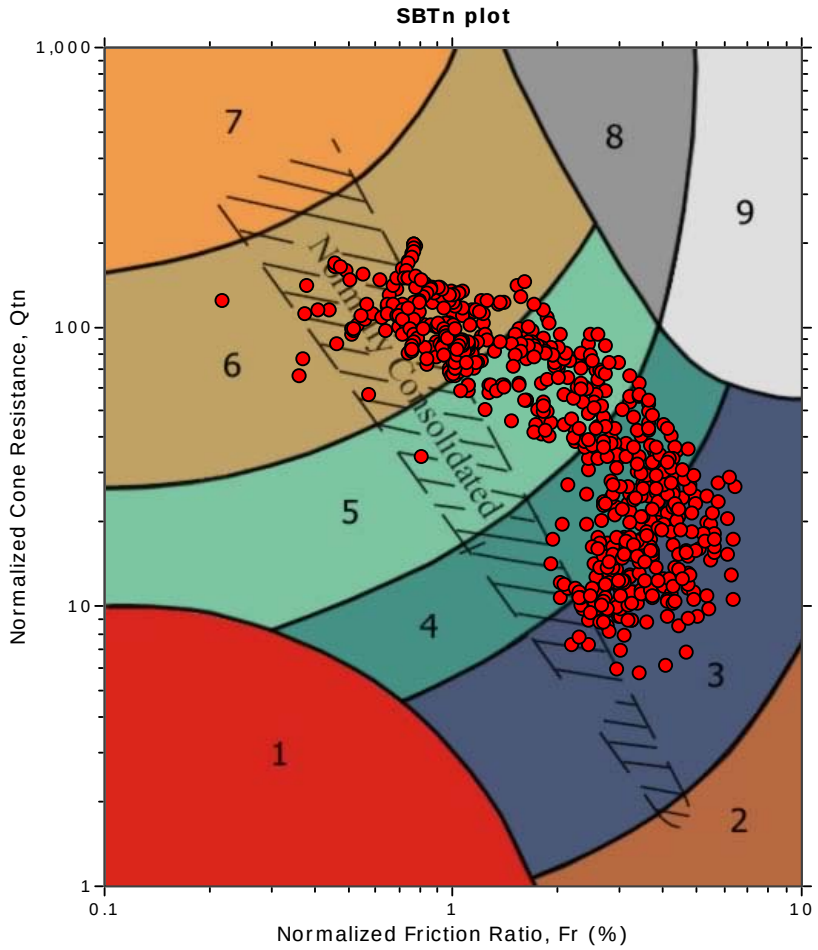
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

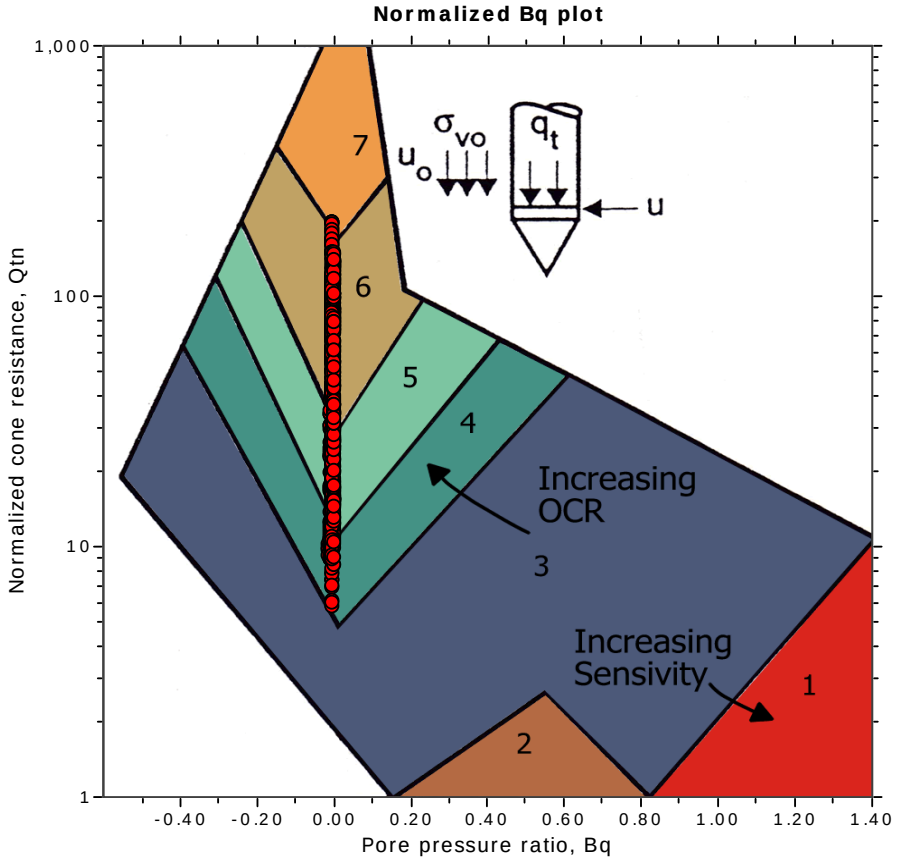
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0273CPT
Total depth: 118.44 ft
Surface Elevation: 320.76 ft
Coords: X:6165999.08, Y:2413729.88

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0273CPT

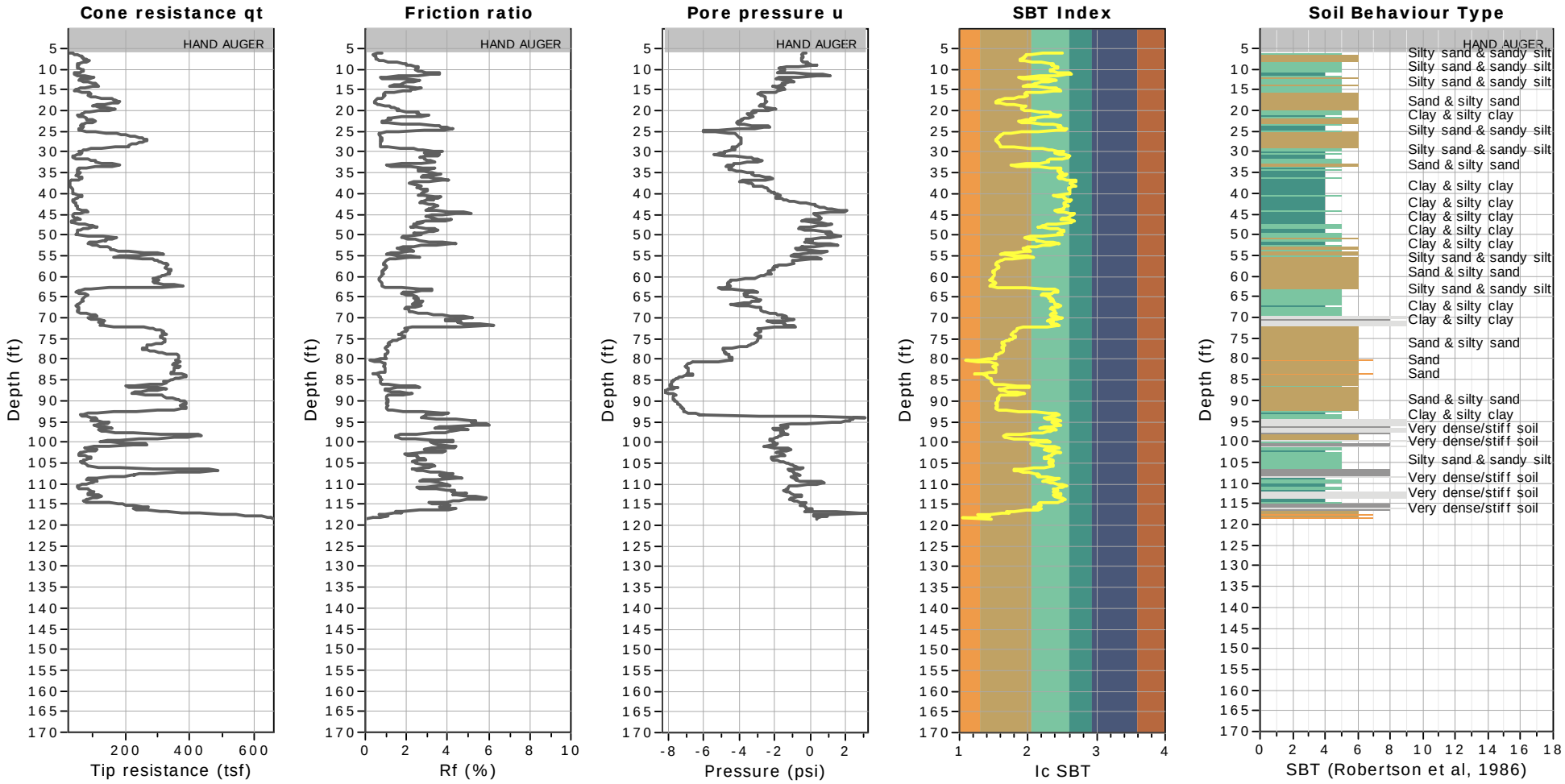
Total depth: 118.44 ft

Surface Elevation: 320.76 ft

Coords: X:6165999.08, Y:2413729.88

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0273CPT

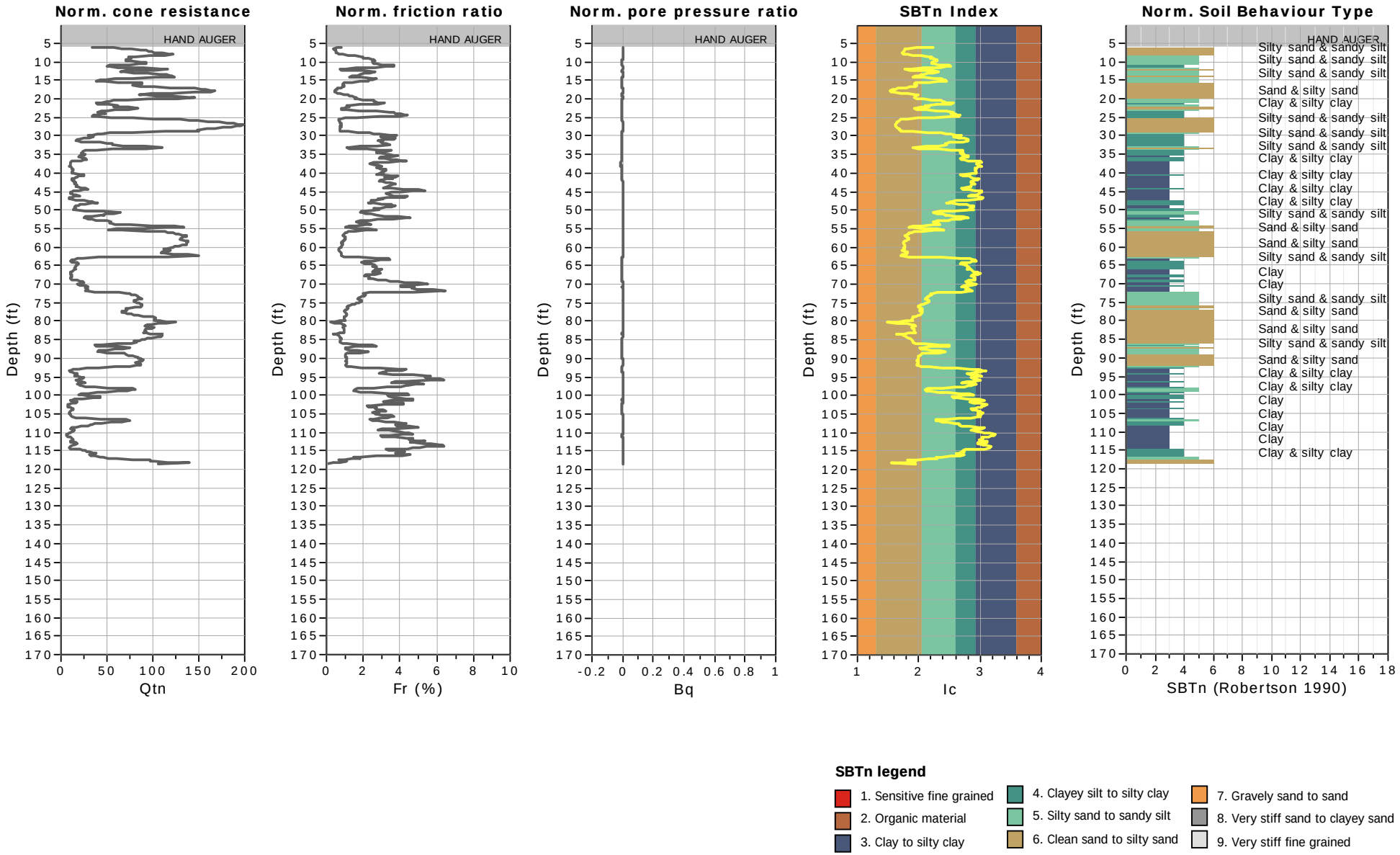
Total depth: 118.44 ft

Surface Elevation: 320.76 ft

Coords: X:6165999.08, Y:2413729.88

Project: California High-Speed Train

Location: Fresno-Bakersfield

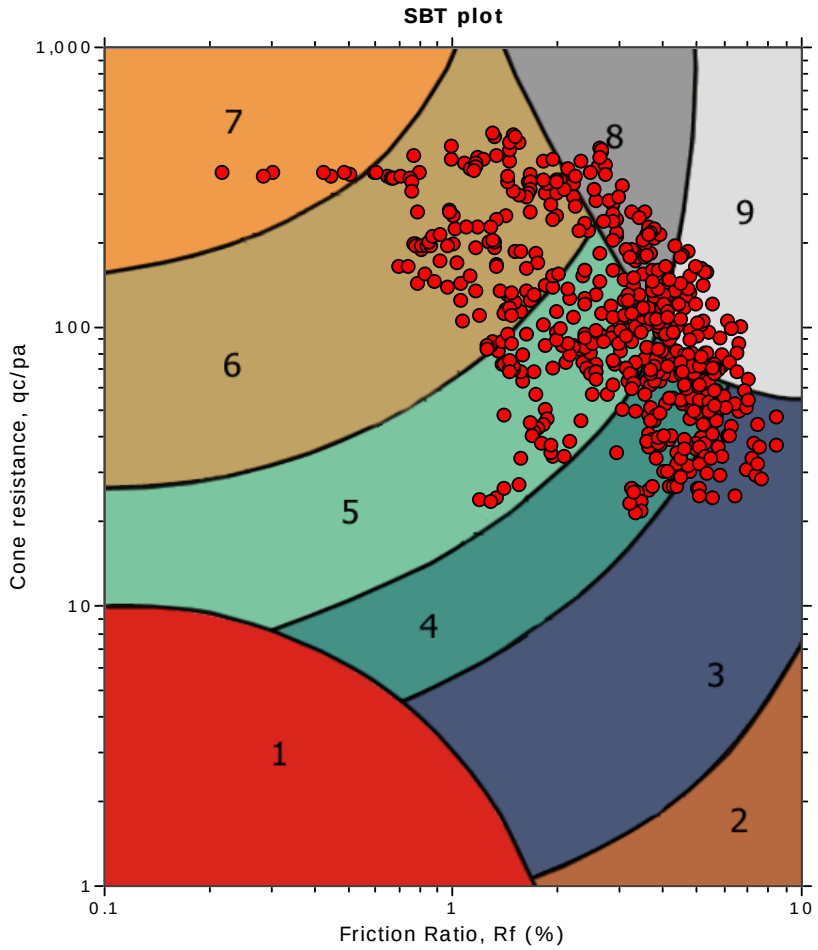


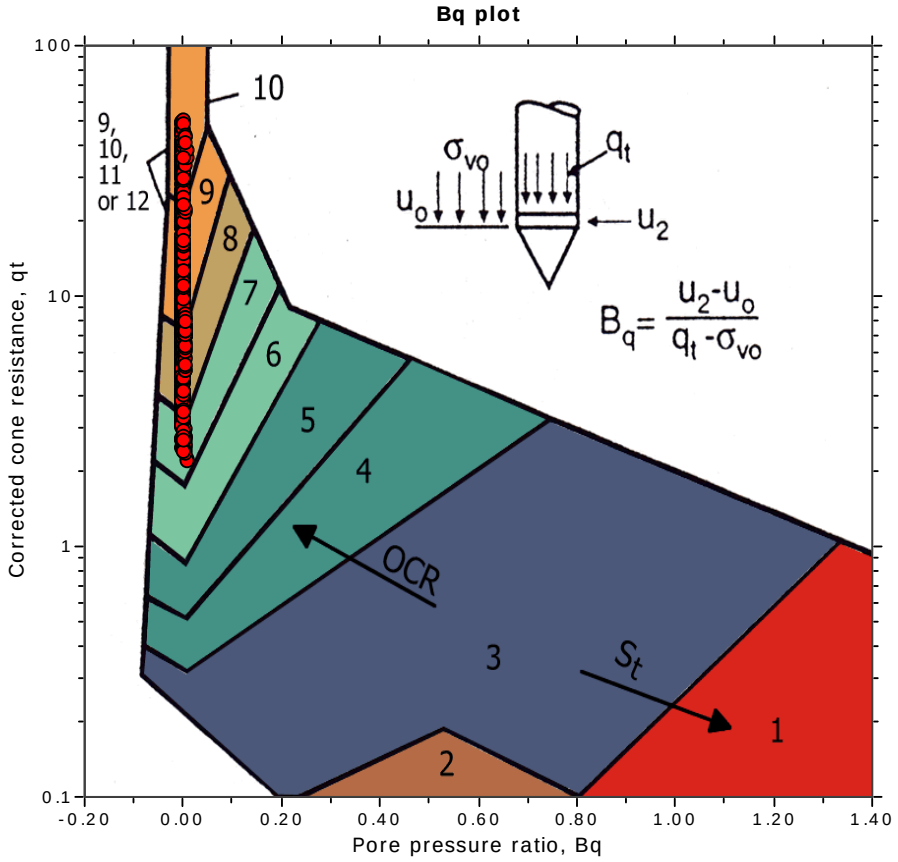
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

SBT - Bq plots





SBT legend

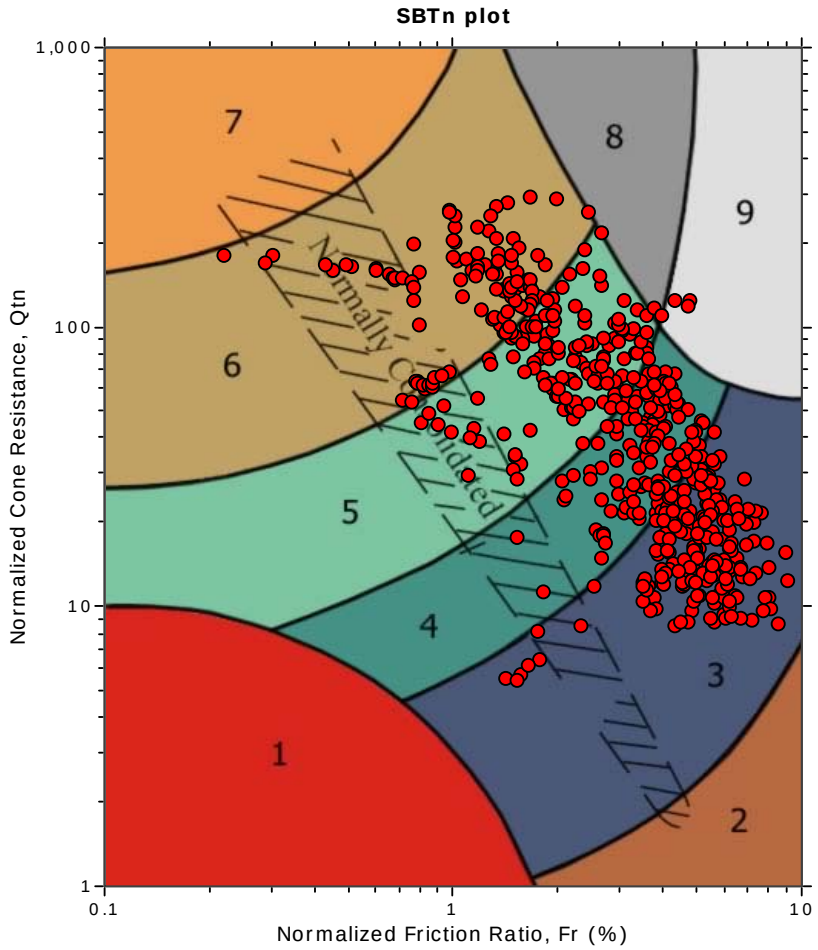
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

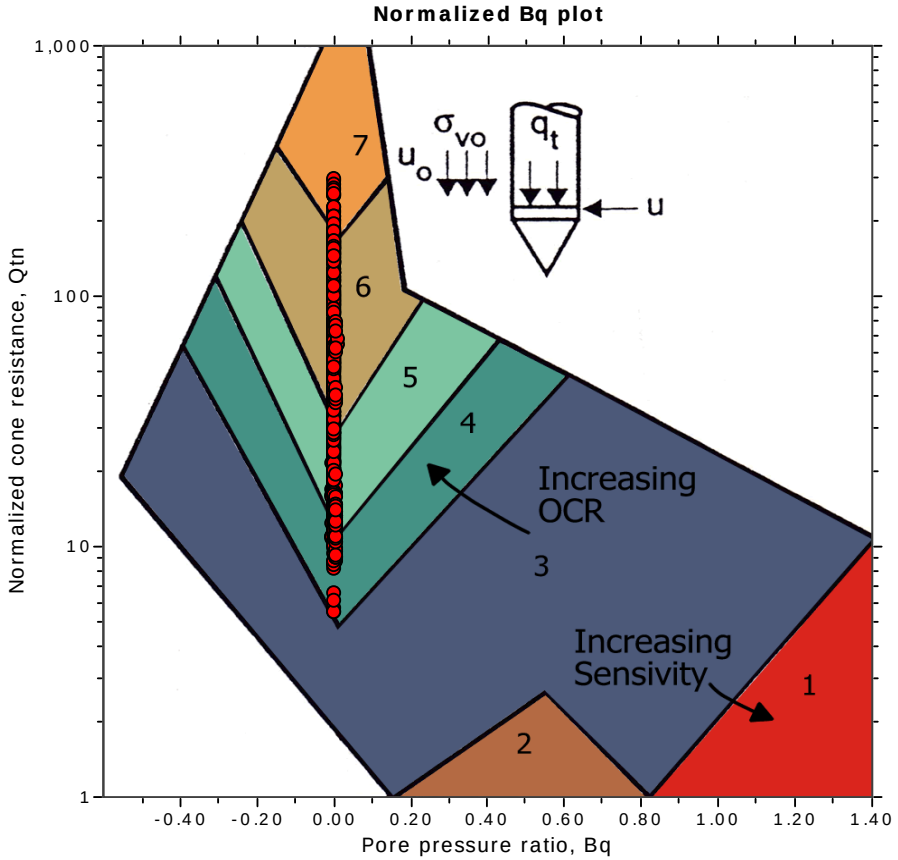
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0274CPT
Total depth: 98.59 ft
Surface Elevation: 317.56 ft
Coords: X:6163925.38, Y:2413176.01

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0274CPT

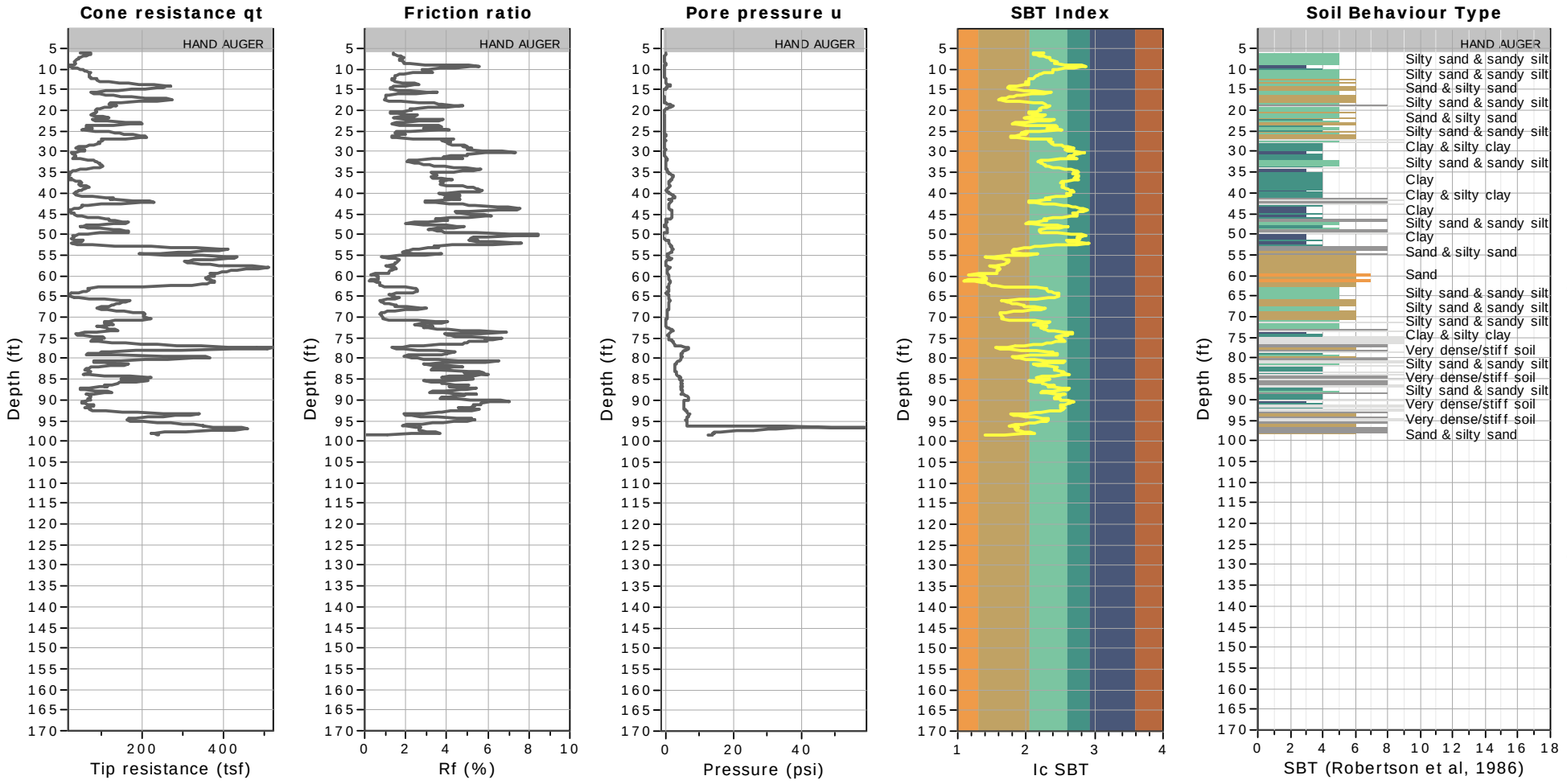
Total depth: 98.59 ft

Surface Elevation: 317.56 ft

Coords: X:6163925.38, Y:2413176.01

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0274CPT

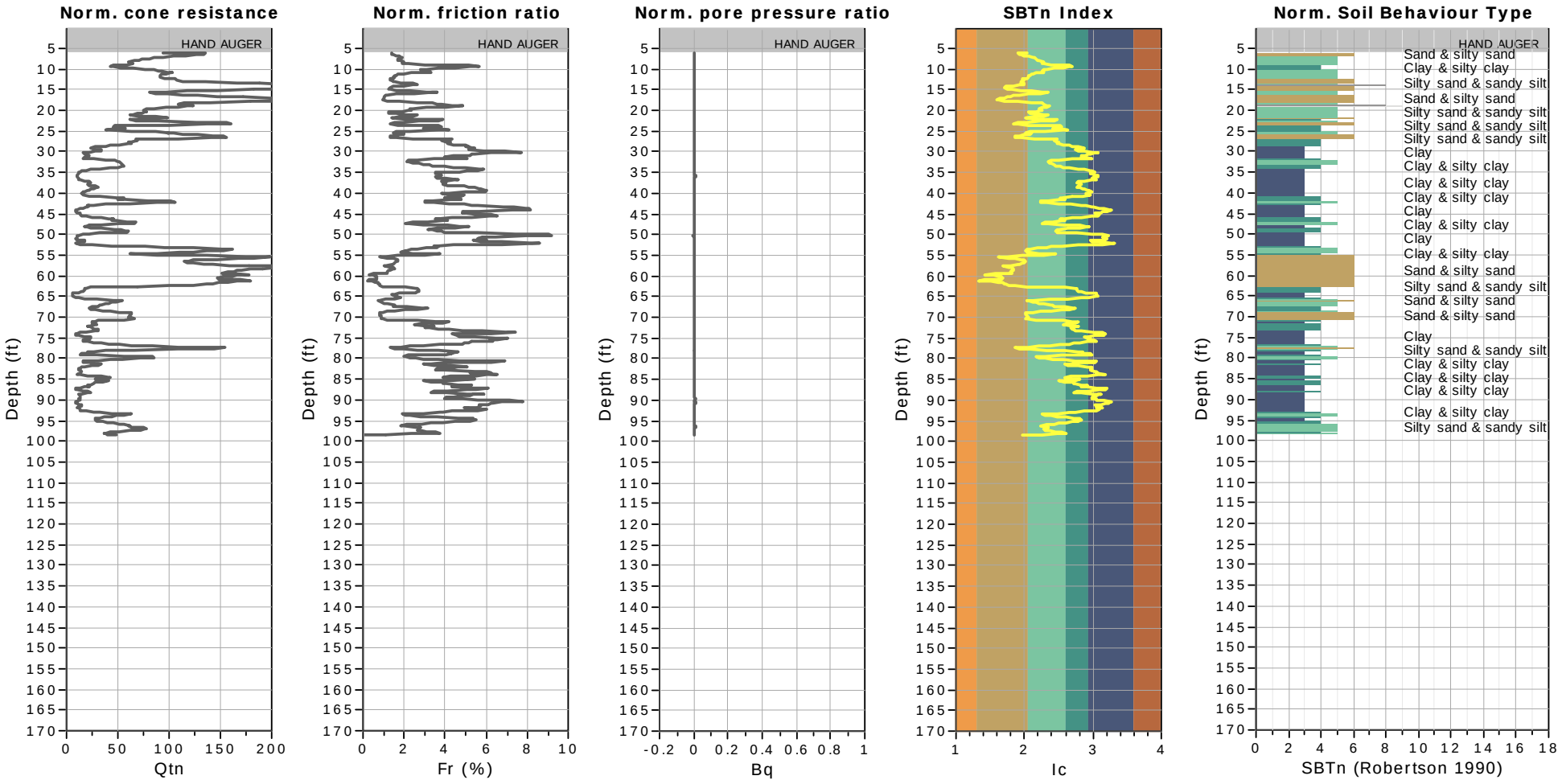
Total depth: 98.59 ft

Surface Elevation: 317.56 ft

Coords: X:6163925.38, Y:2413176.01

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

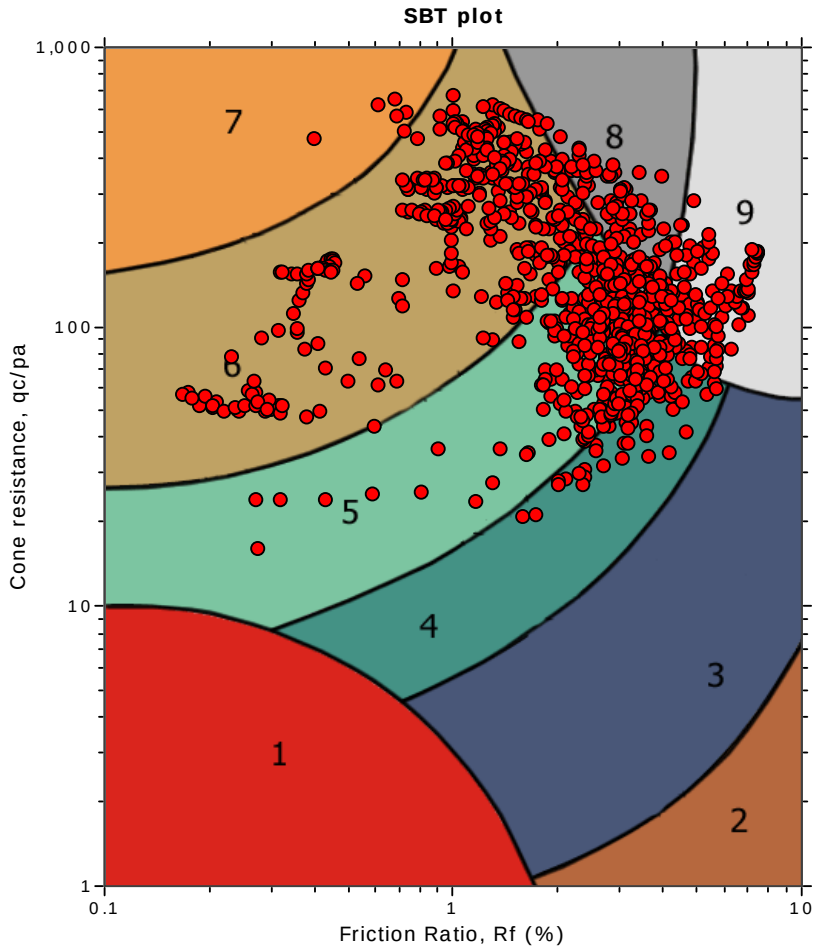
CPT: S0279CPT

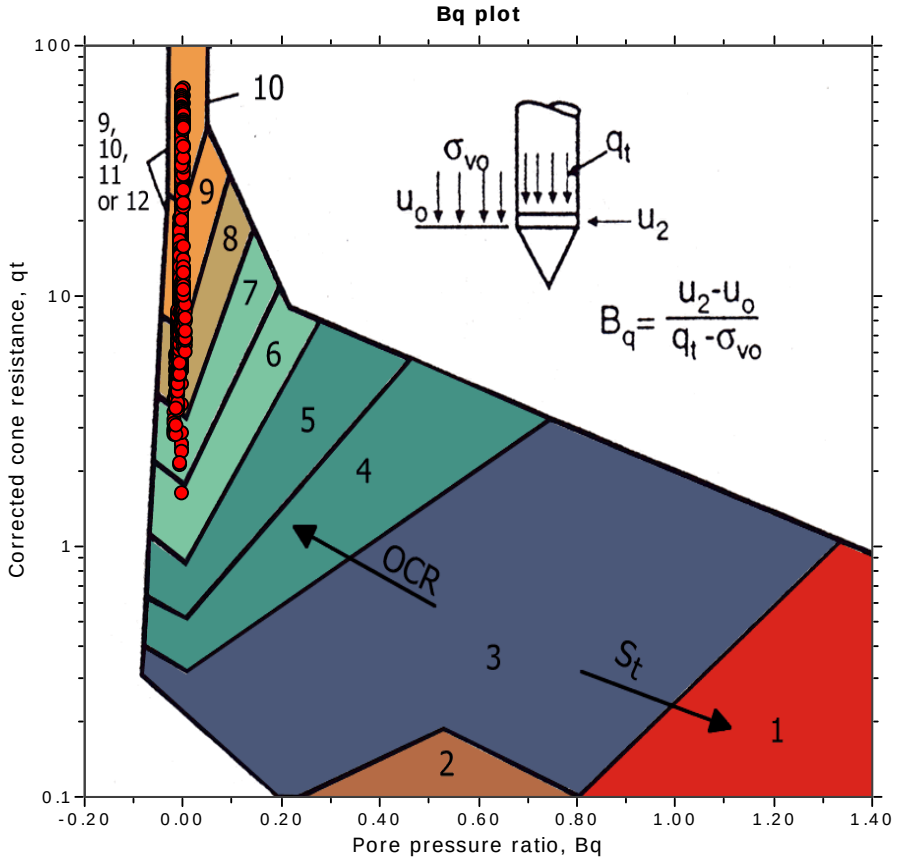
Total depth: 167.65 ft

Surface Elevation: 328.30 ft

Coords: X:6165173.61, Y:2407438.23

SBT - Bq plots





SBT legend

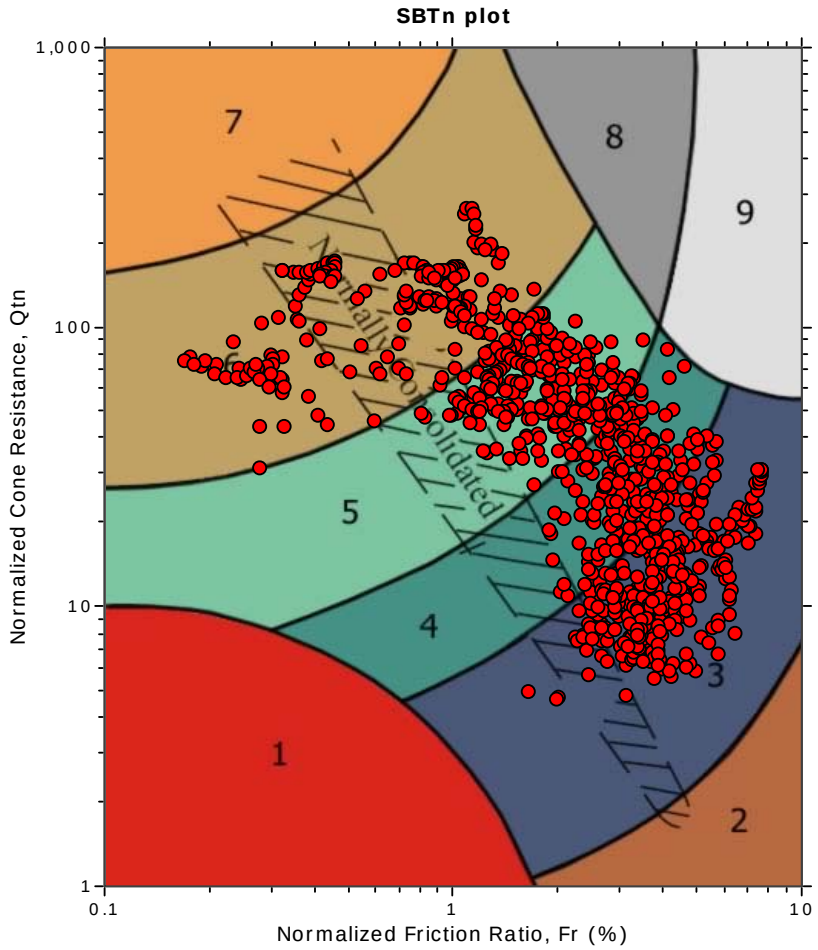
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

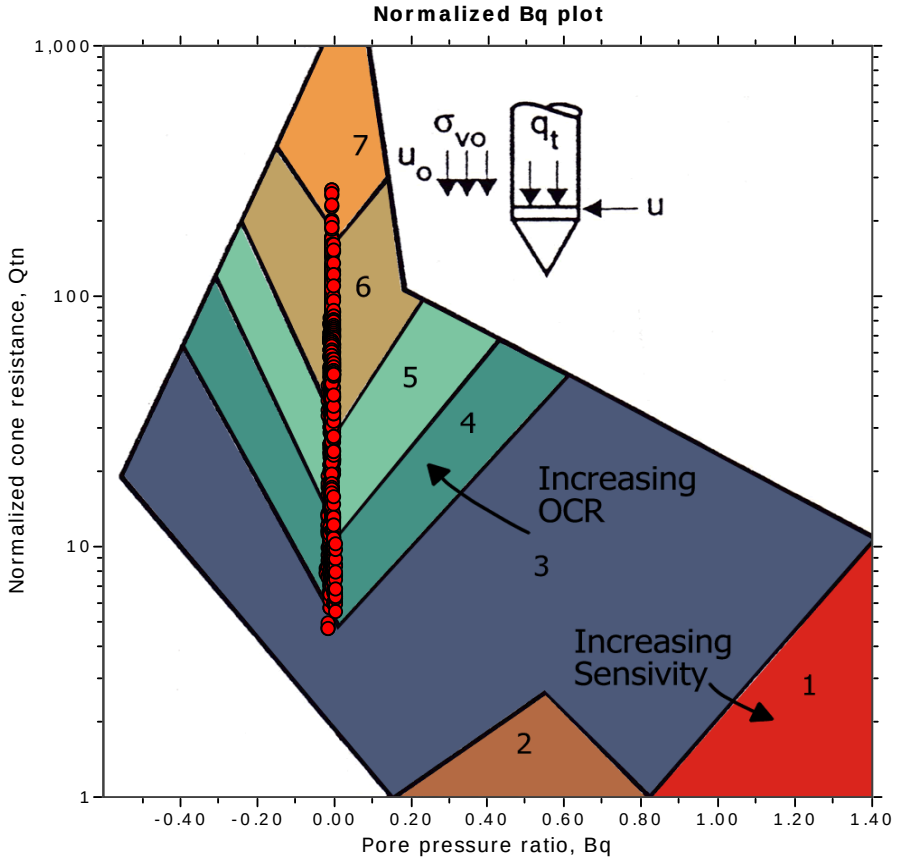
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0279CPT
Total depth: 167.65 ft
Surface Elevation: 328.30 ft
Coords: X:6165173.61, Y:2407438.23

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0279CPT

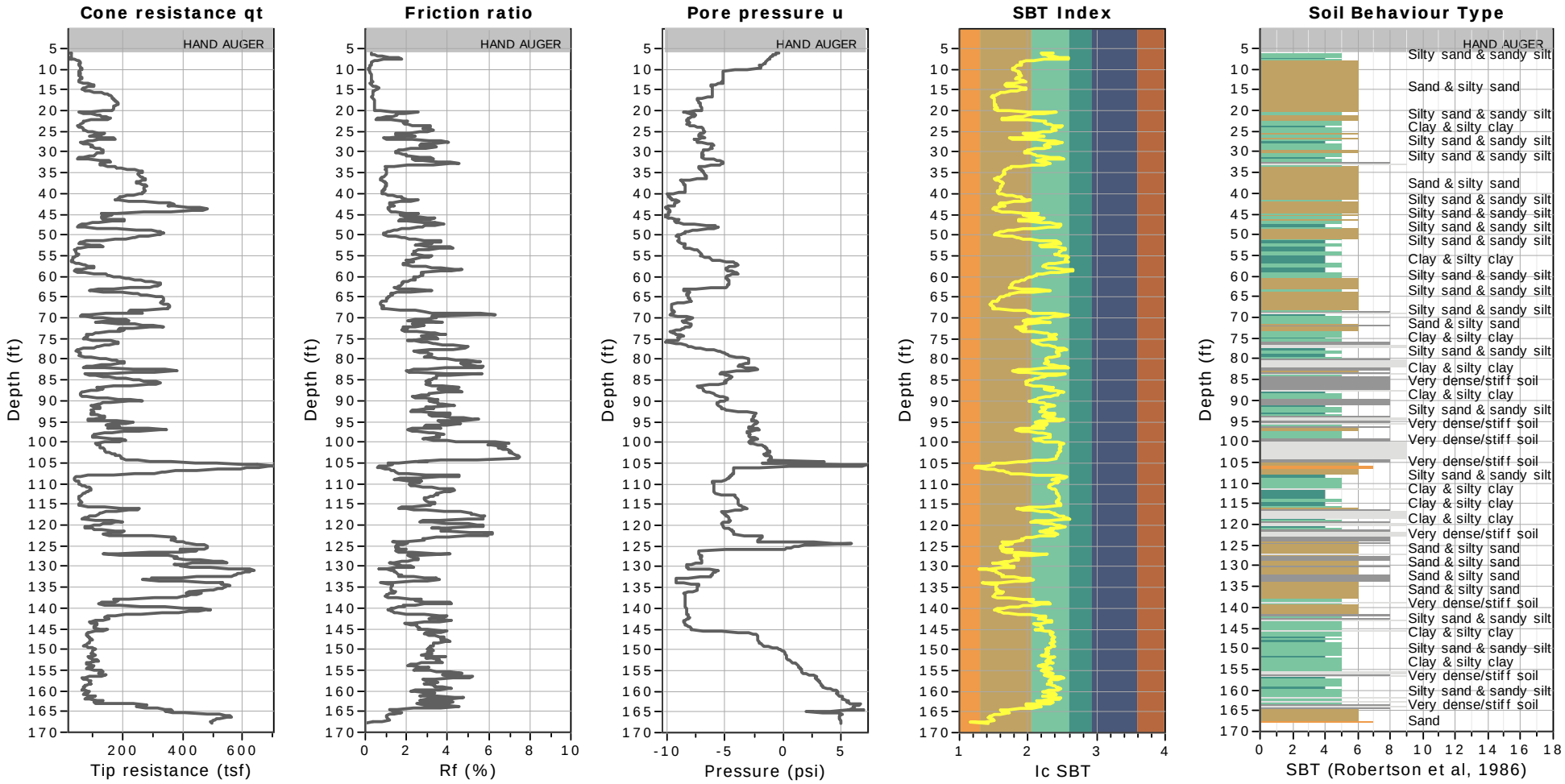
Total depth: 167.65 ft

Surface Elevation: 328.30 ft

Coords: X:6165173.61, Y:2407438.23

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0279CPT

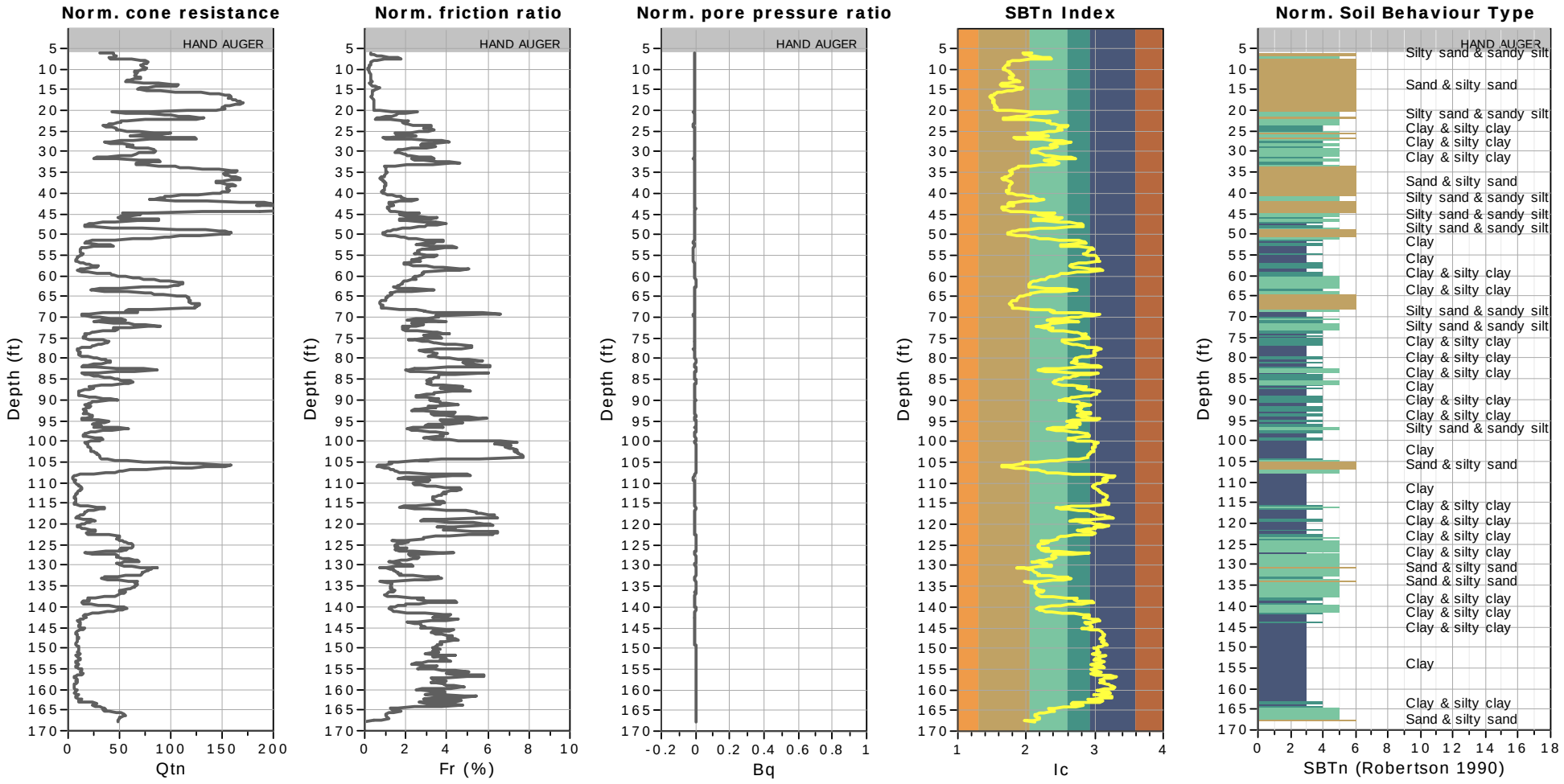
Total depth: 167.65 ft

Surface Elevation: 328.30 ft

Coords: X:6165173.61, Y:2407438.23

Project: California High-Speed Train

Location: Fresno-Bakersfield



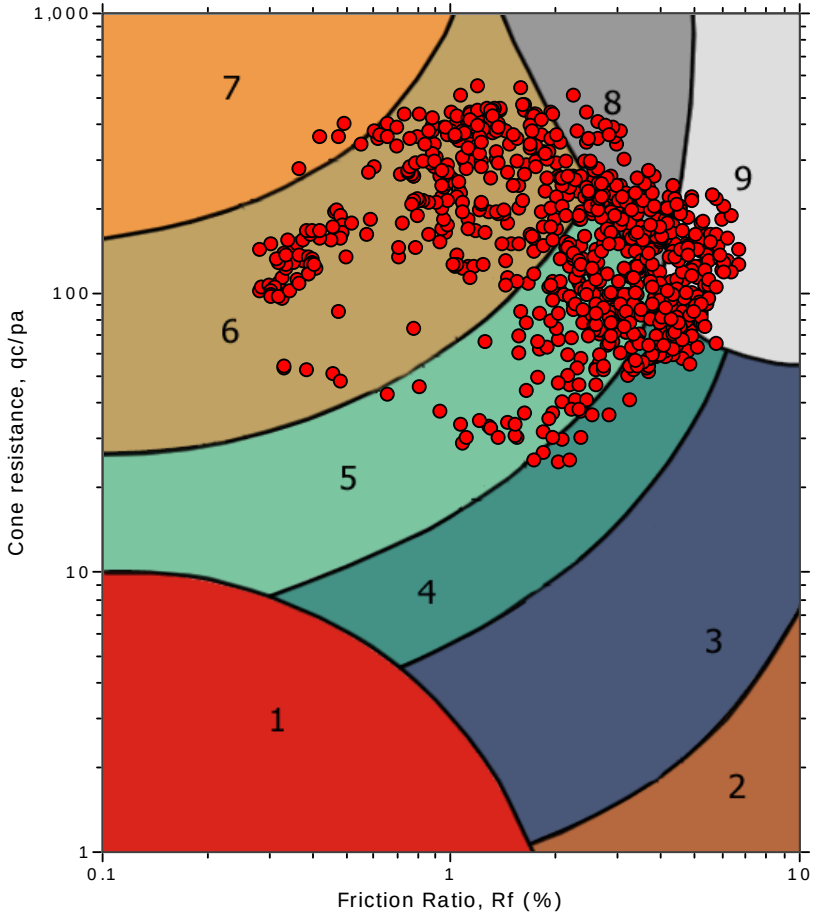
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

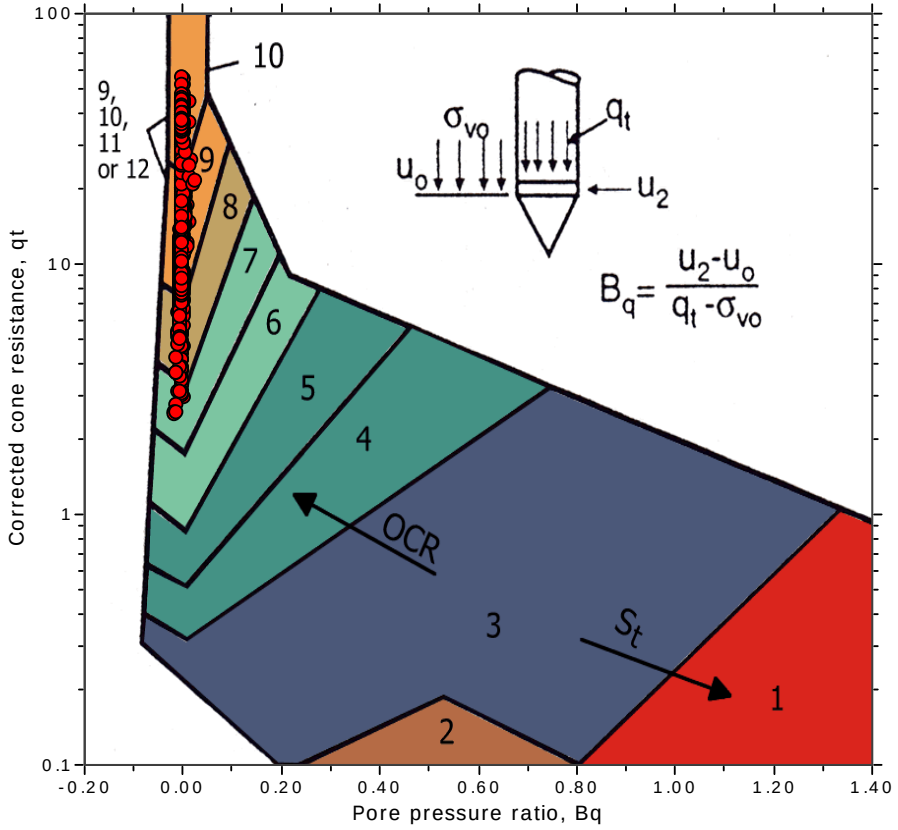
CPT: S0280CPT
Total depth: 152.40 ft
Surface Elevation: 331.43 ft
Coords: X:6165549.37, Y:2405615.88

SBT - Bq plots

SBT plot



Bq plot



SBT legend

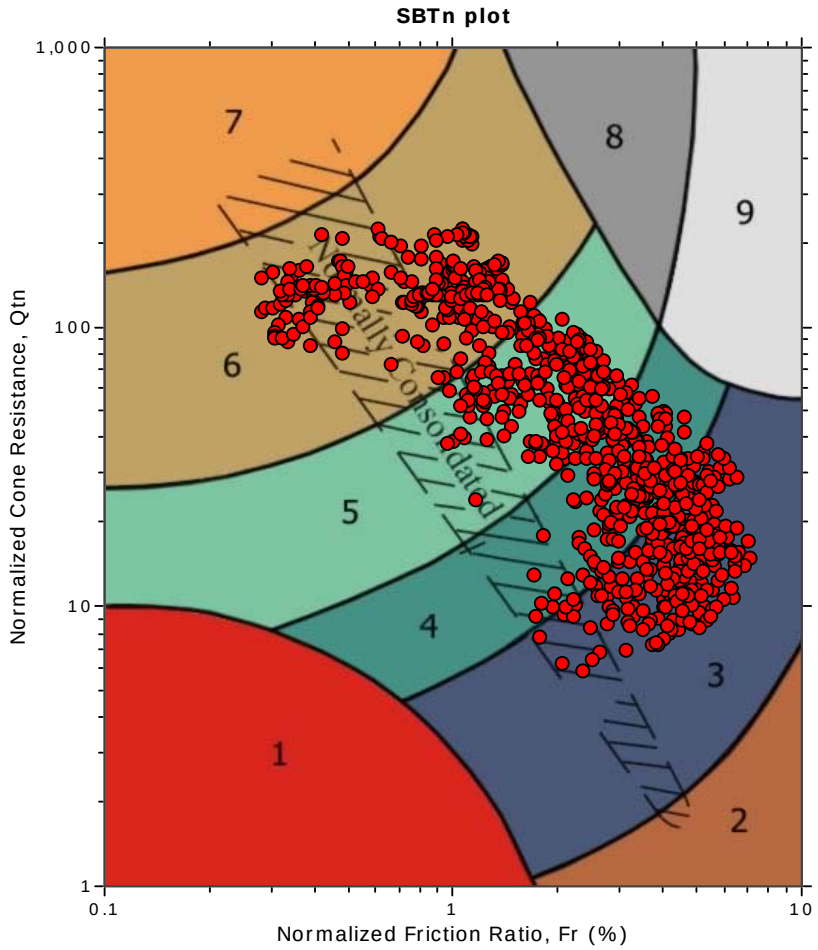
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

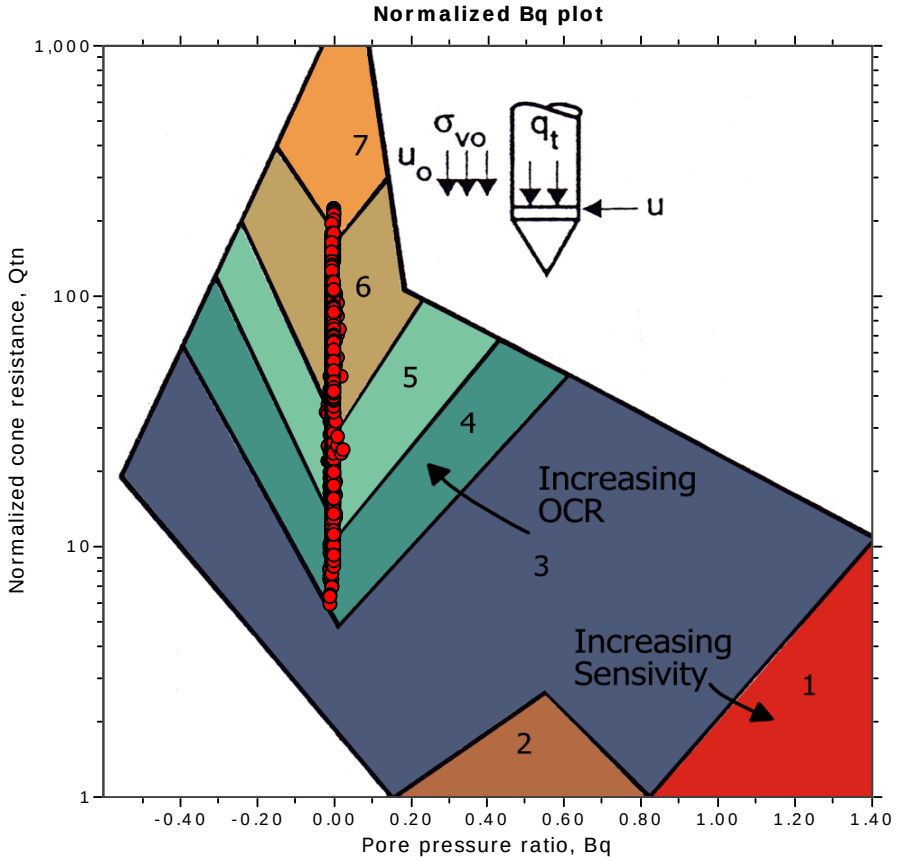
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0280CPT
Total depth: 152.40 ft
Surface Elevation: 331.43 ft
Coords: X:6165549.37, Y:2405615.88

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0280CPT

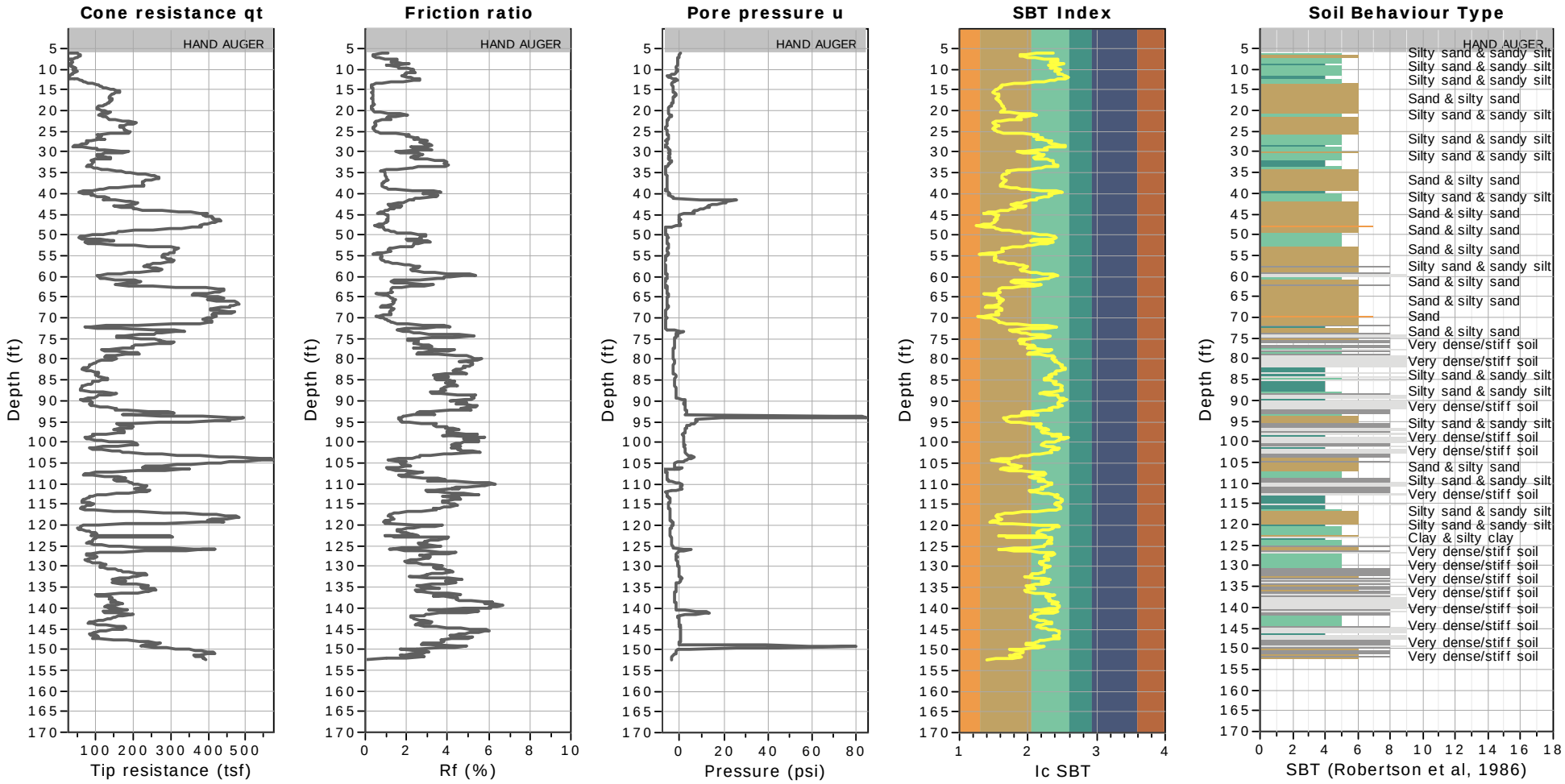
Total depth: 152.40 ft

Surface Elevation: 331.43 ft

Coords: X:6165549.37, Y:2405615.88

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

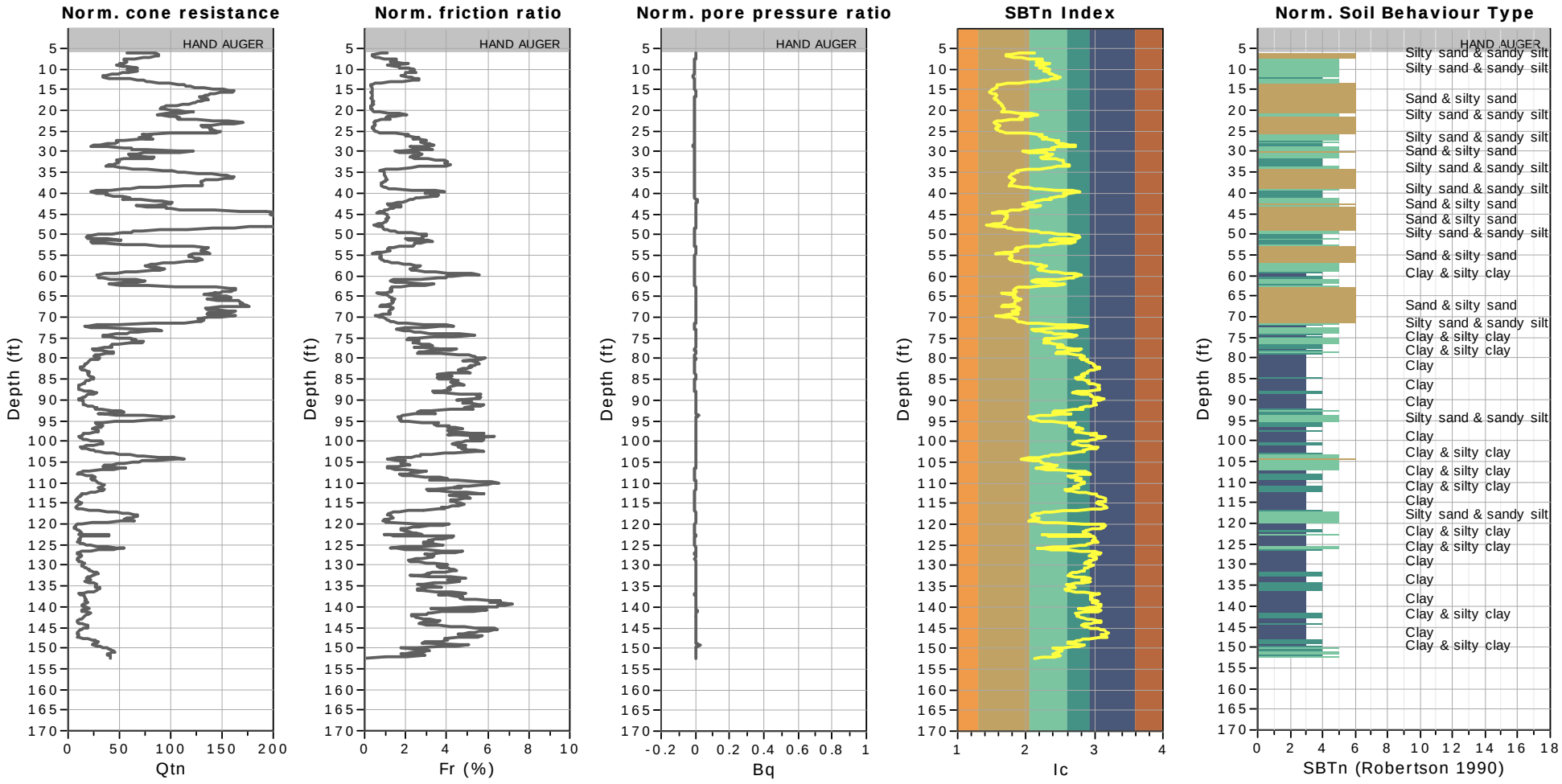
Location: Fresno-Bakersfield

CPT: S0280CPT

Total depth: 152.40 ft

Surface Elevation: 331.43 ft

Coords: X:6165549.37, Y:2405615.88

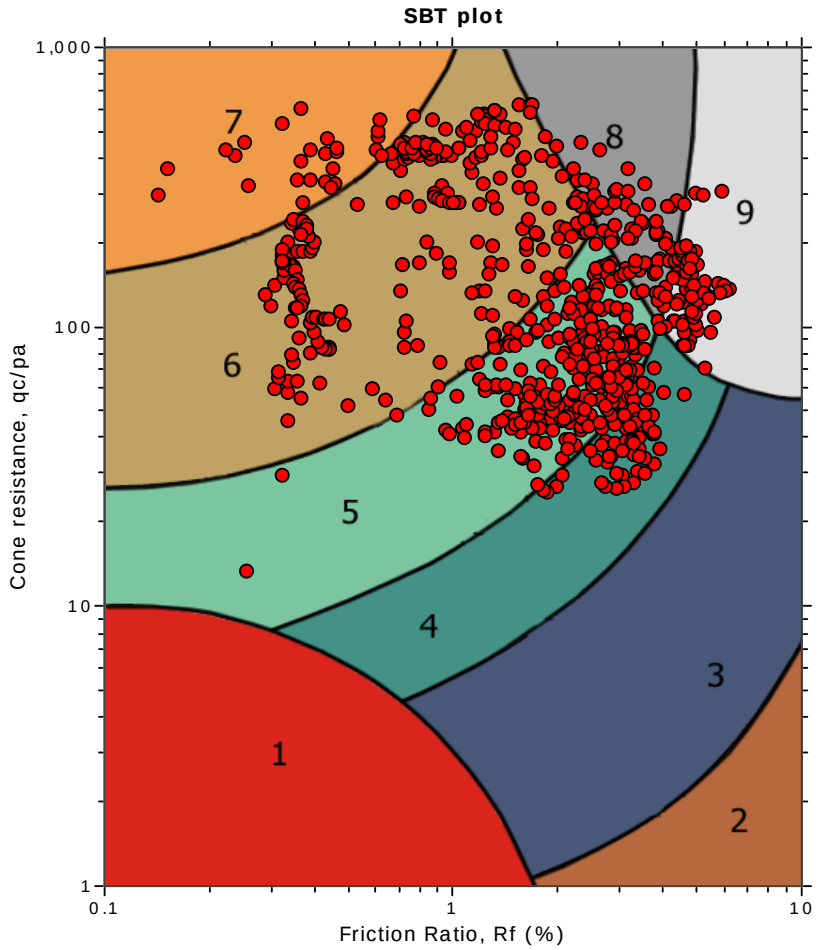


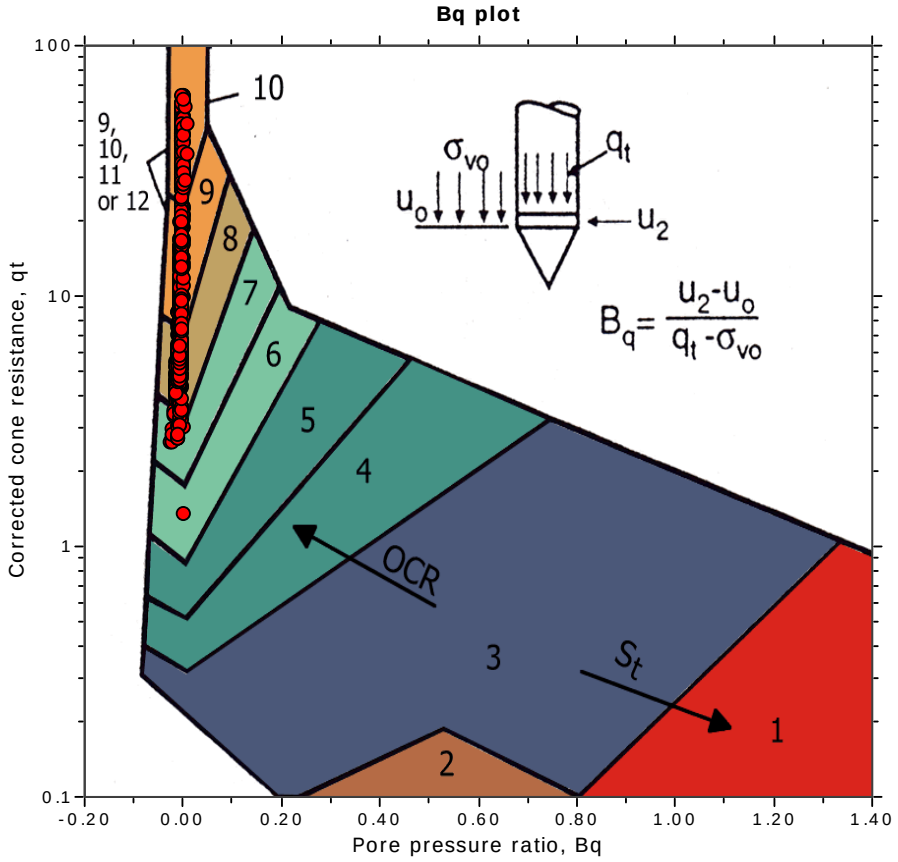
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0282CPT
Total depth: 126.97 ft
Surface Elevation: 331.05 ft
Coords: X:6165533.35, Y:2404273.09

SBT - Bq plots



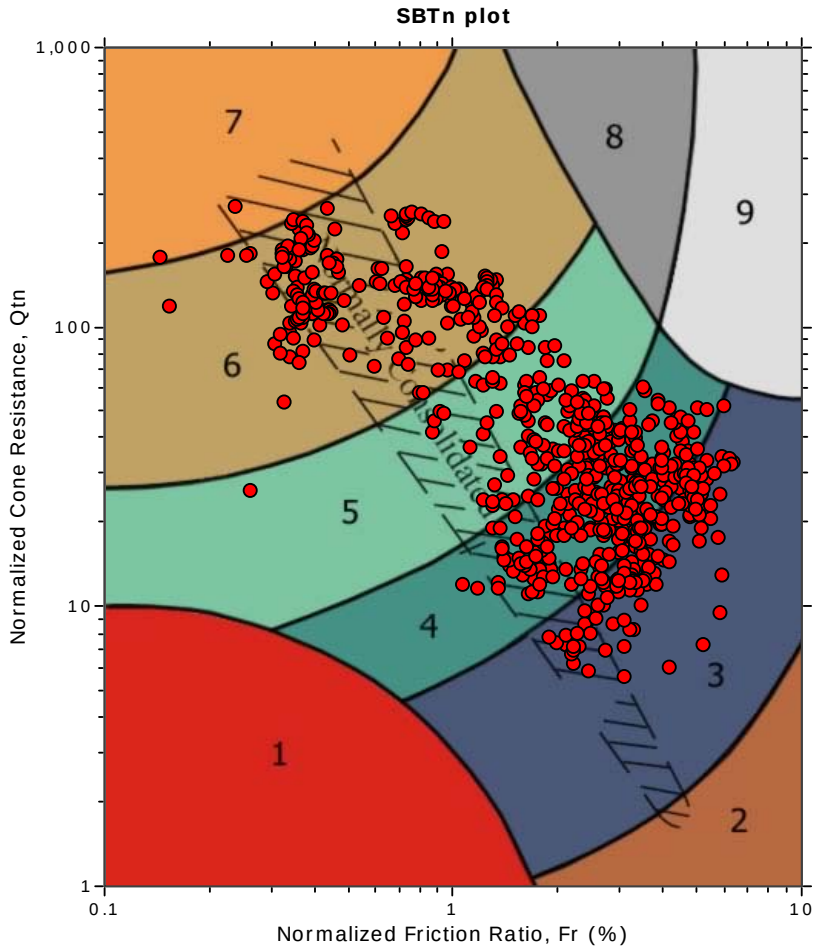


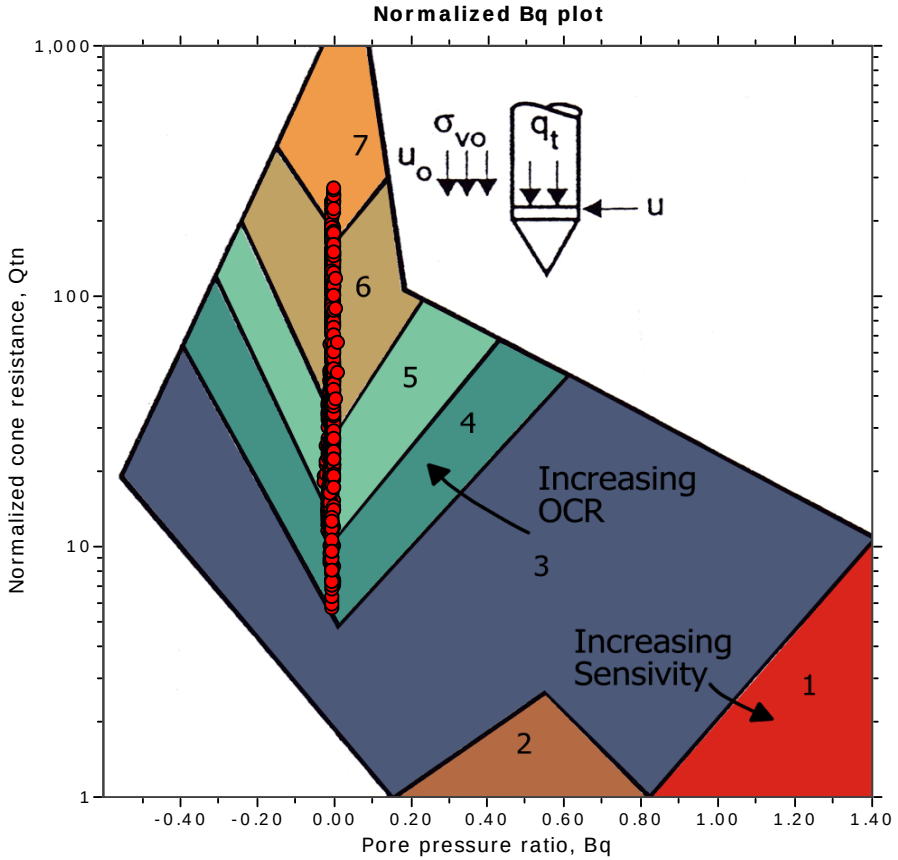
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0282CPT

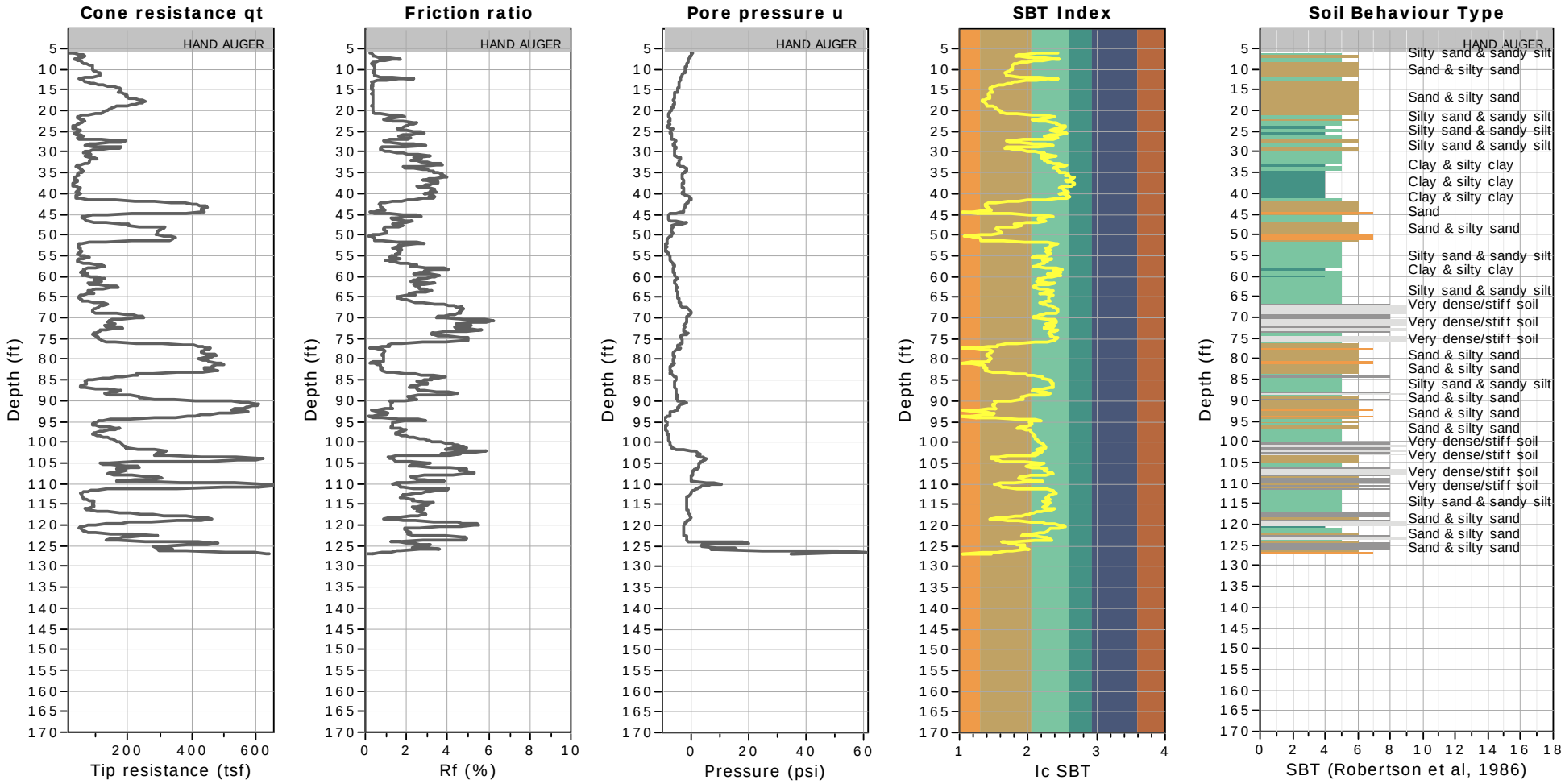
Total depth: 126.97 ft

Surface Elevation: 331.05 ft

Coords: X:6165533.35, Y:2404273.09

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0282CPT

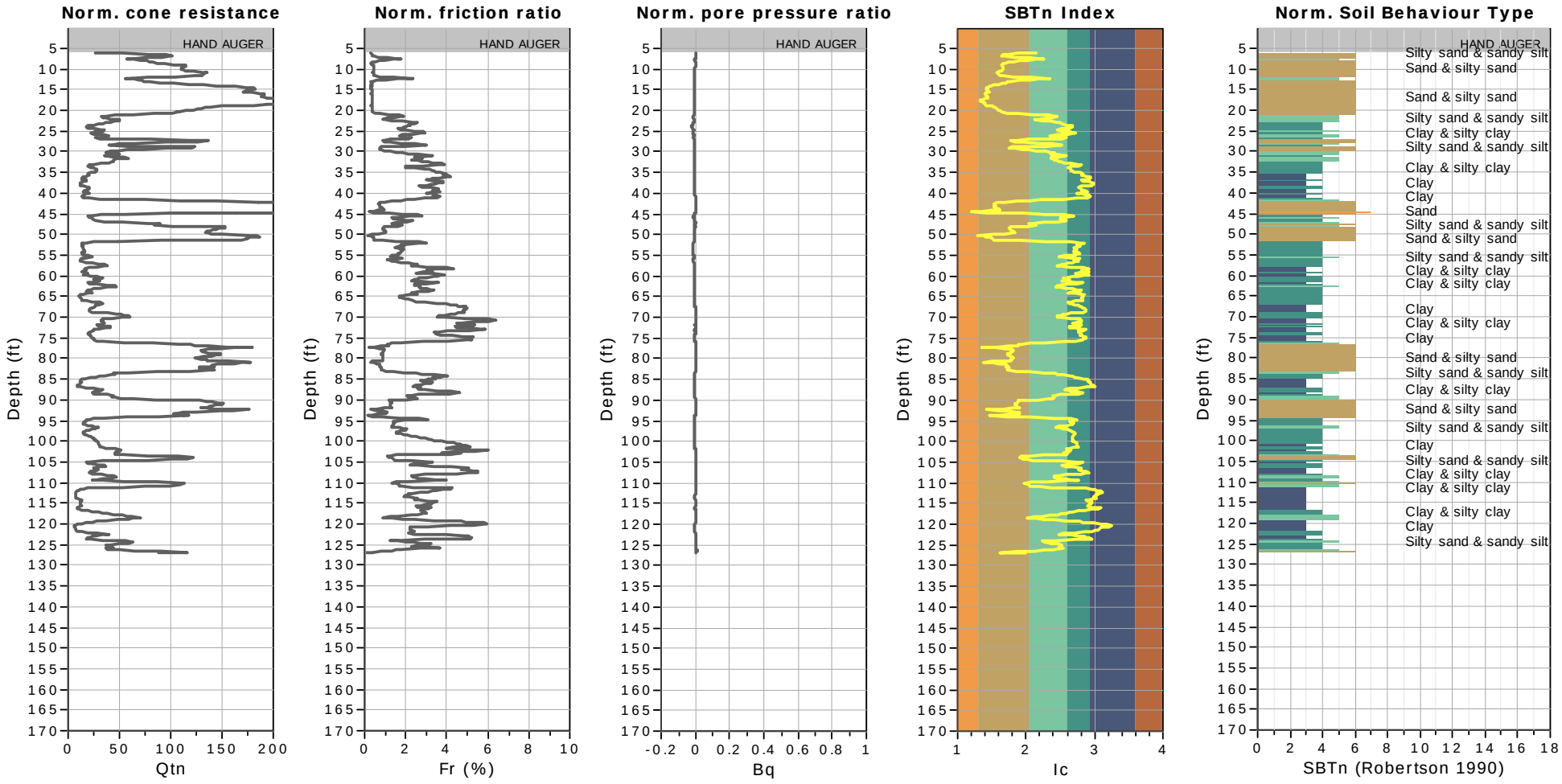
Total depth: 126.97 ft

Surface Elevation: 331.05 ft

Coords: X:6165533.35, Y:2404273.09

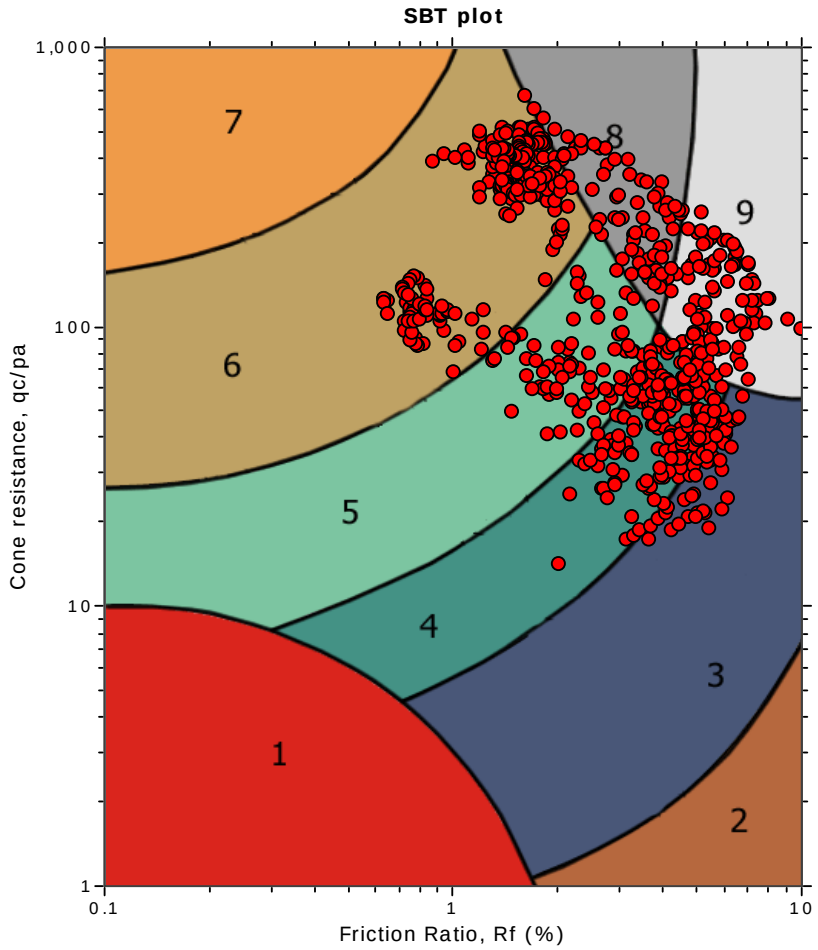
Project: California High-Speed Train

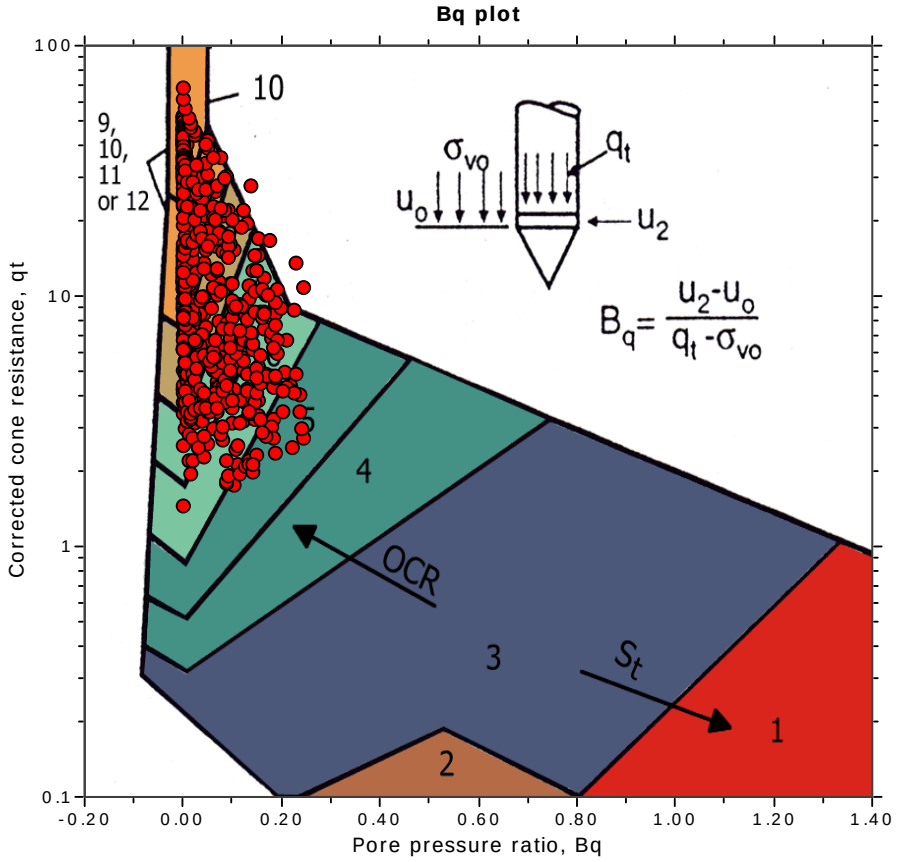
Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots





SBT legend

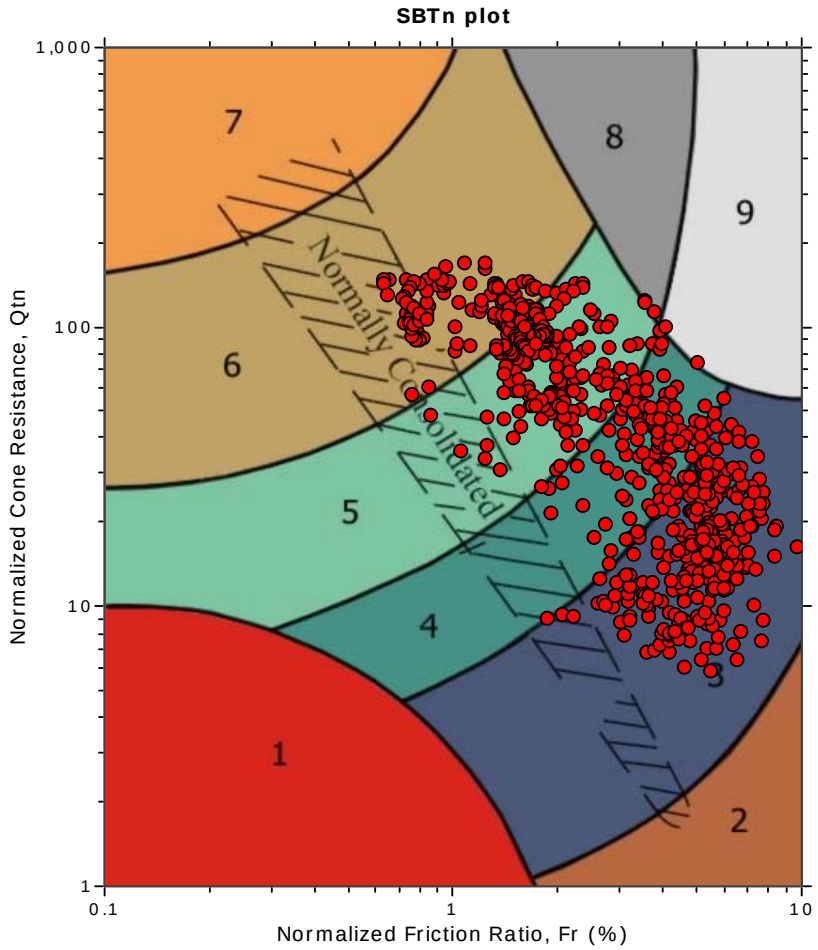
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

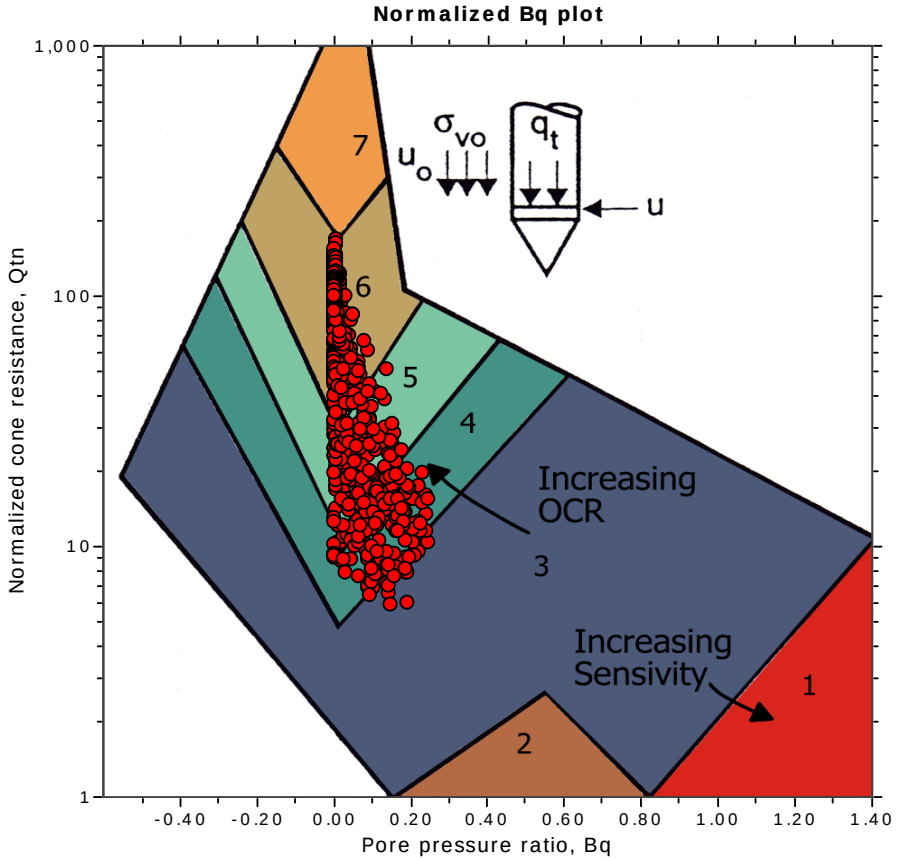
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0283CPT
Total depth: 121.72 ft
Surface Elevation: 331.99 ft
Coords: X:6165487.33, Y:2402685.32

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0283CPT

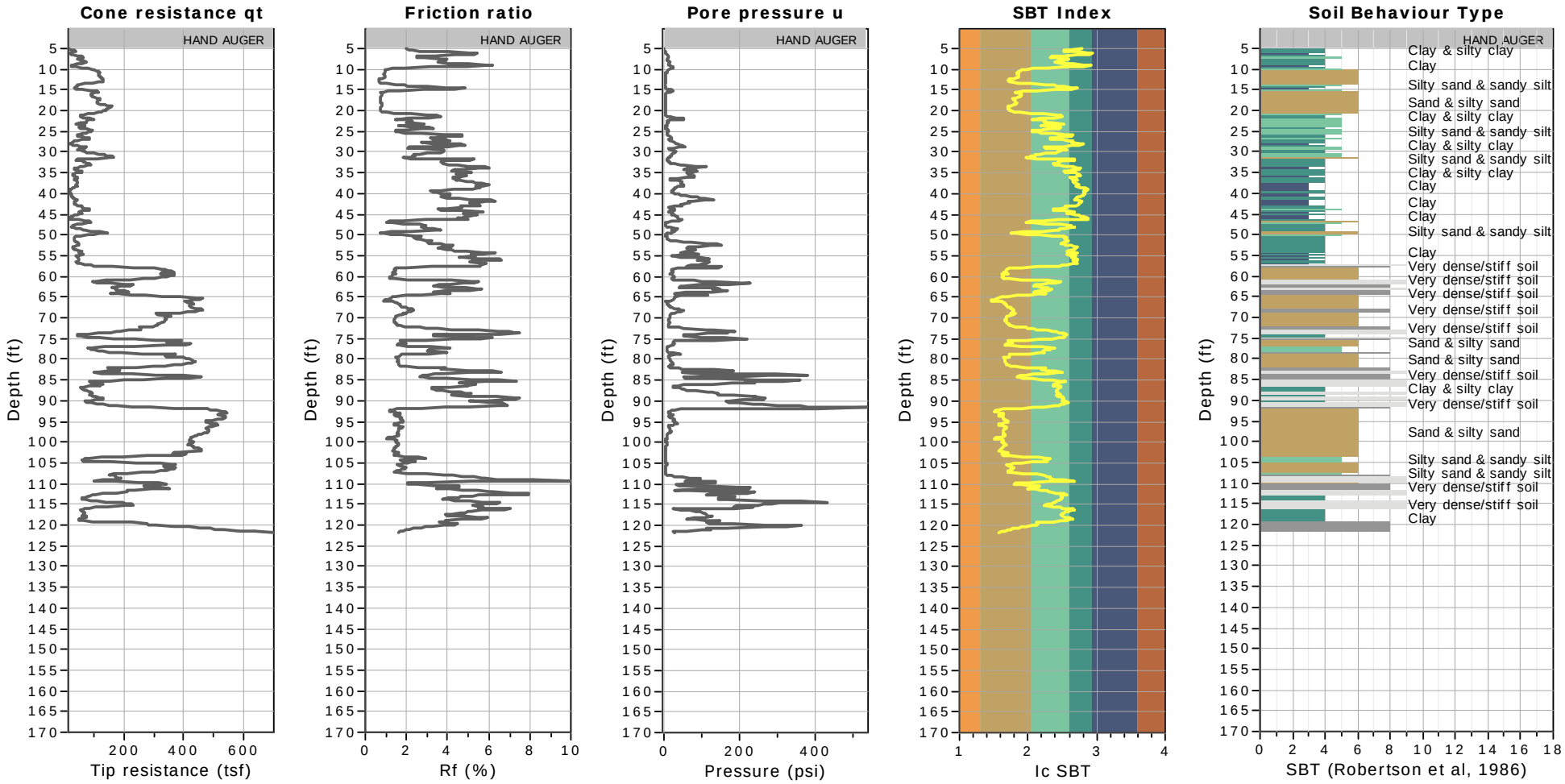
Total depth: 121.72 ft

Surface Elevation: 331.99 ft

Coords: X:6165487.33, Y:2402685.32

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

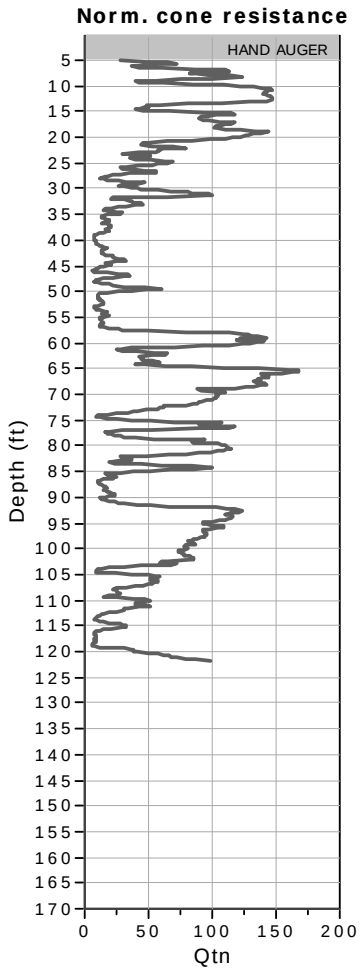
Location: Fresno-Bakersfield

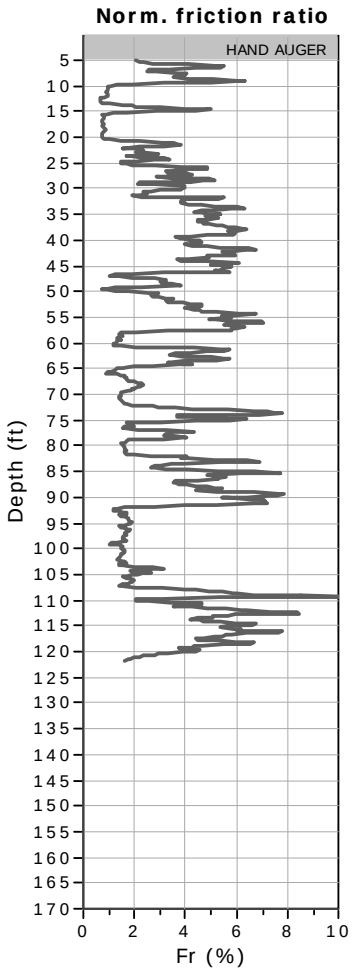
CPT: S0283CPT

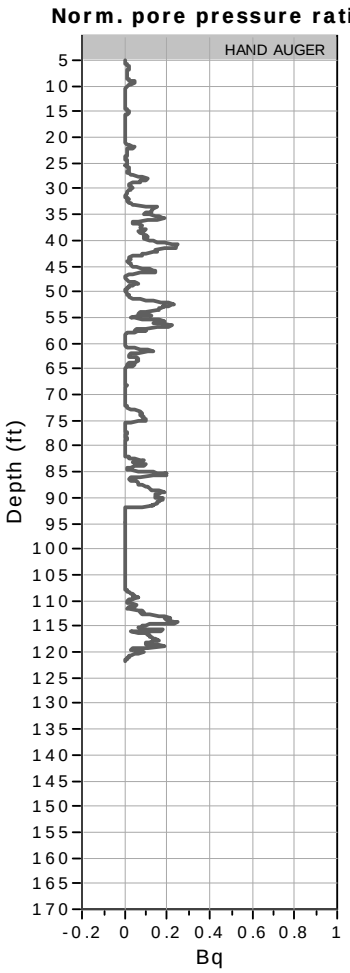
Total depth: 121.72 ft

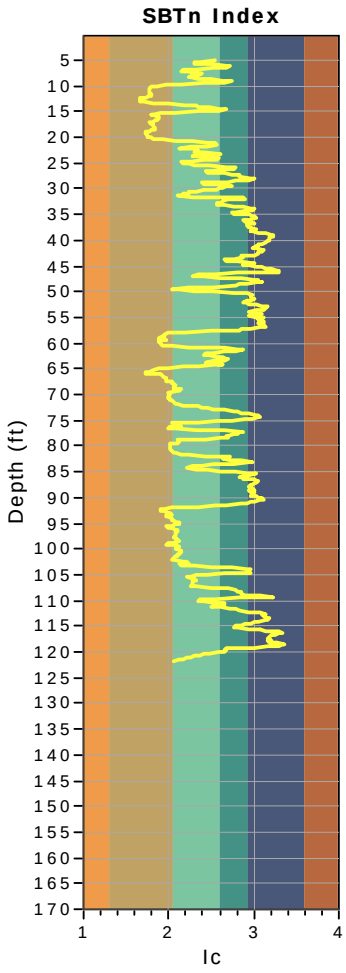
Surface Elevation: 331.99 ft

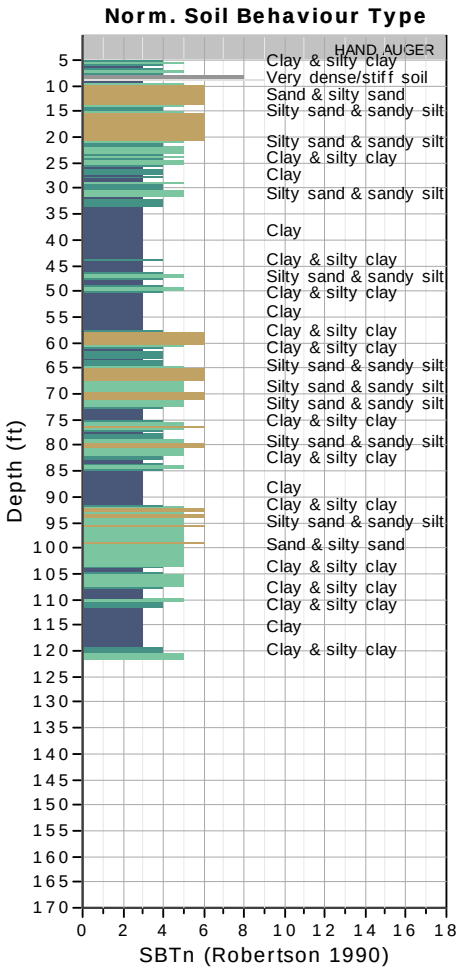
Coords: X:6165487.33, Y:2402685.32









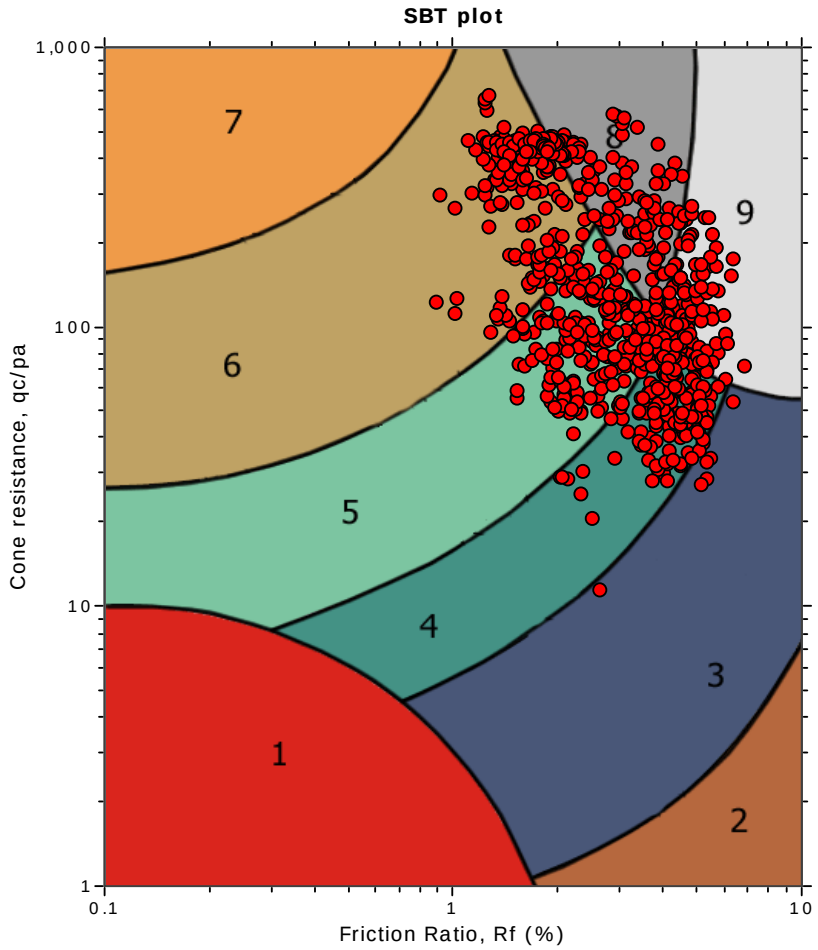


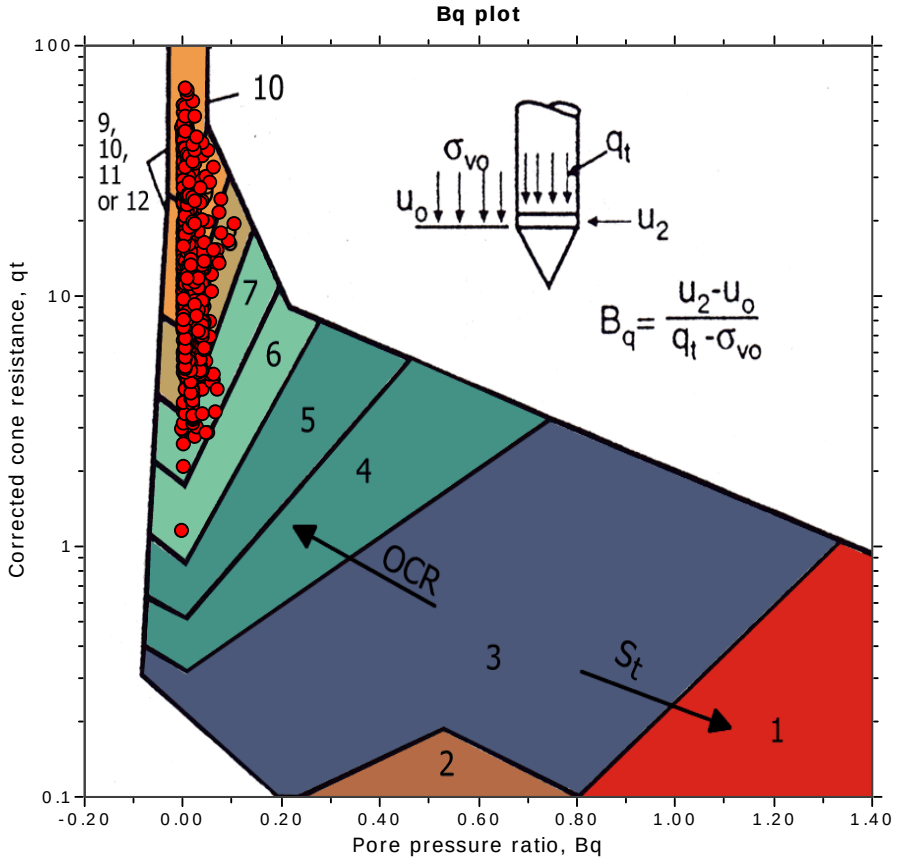
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots





SBT legend

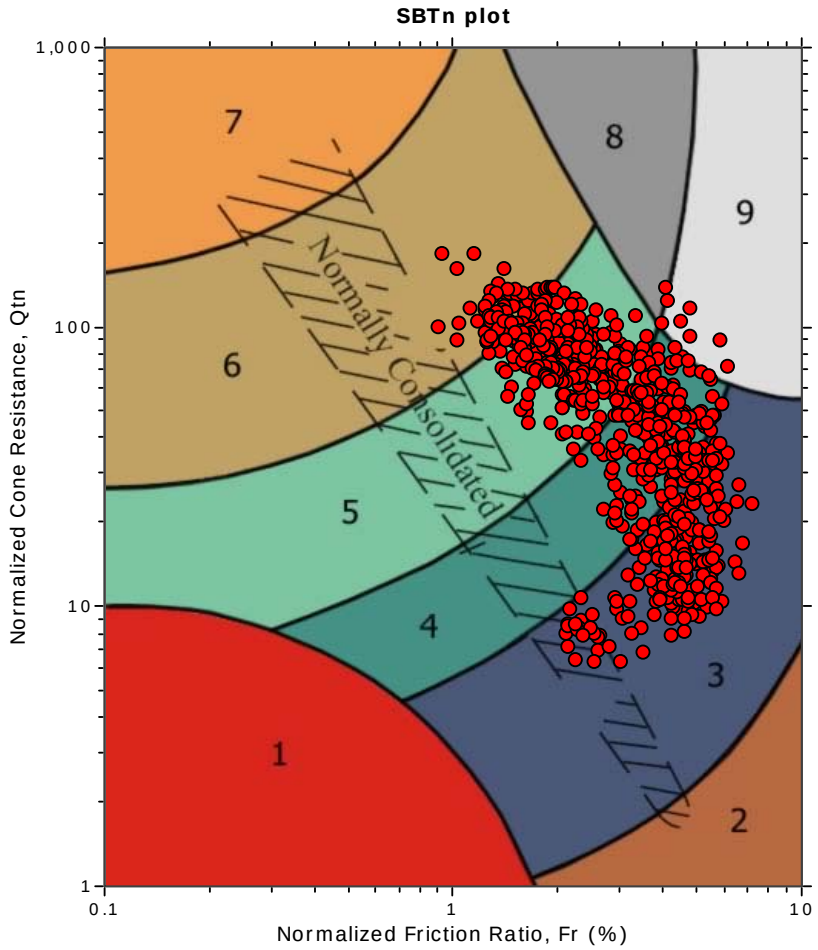
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

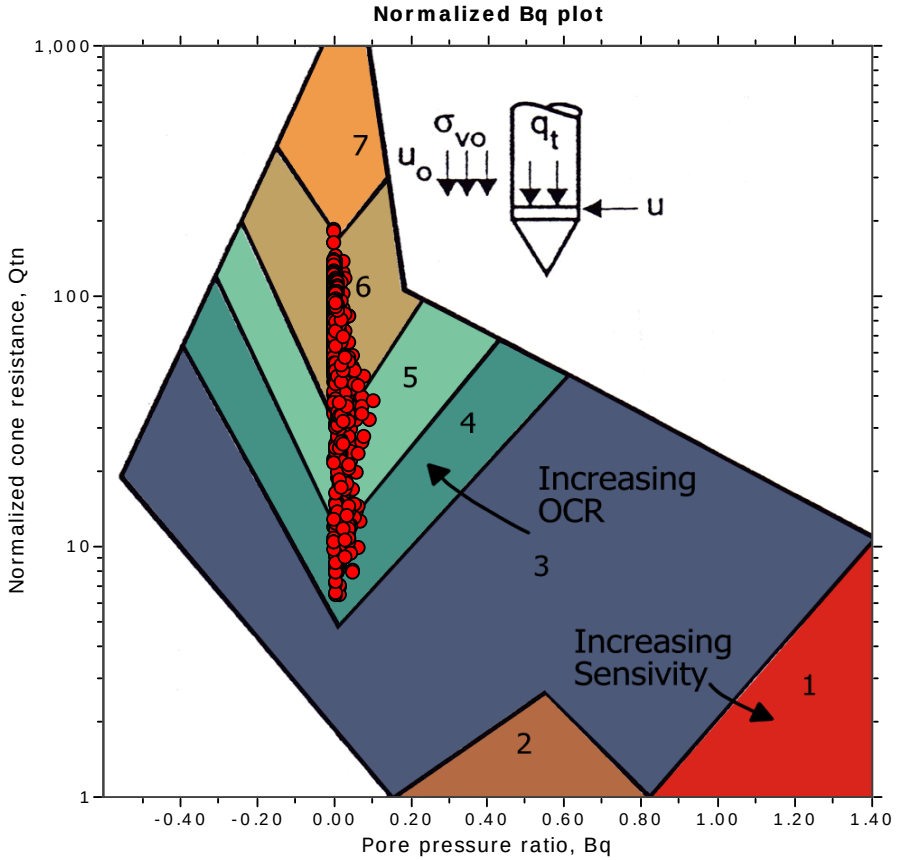
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0285ACPT
Total depth: 129.76 ft
Surface Elevation: 334.04 ft
Coords: X:6165396.03, Y:2399948.84

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0285ACPT

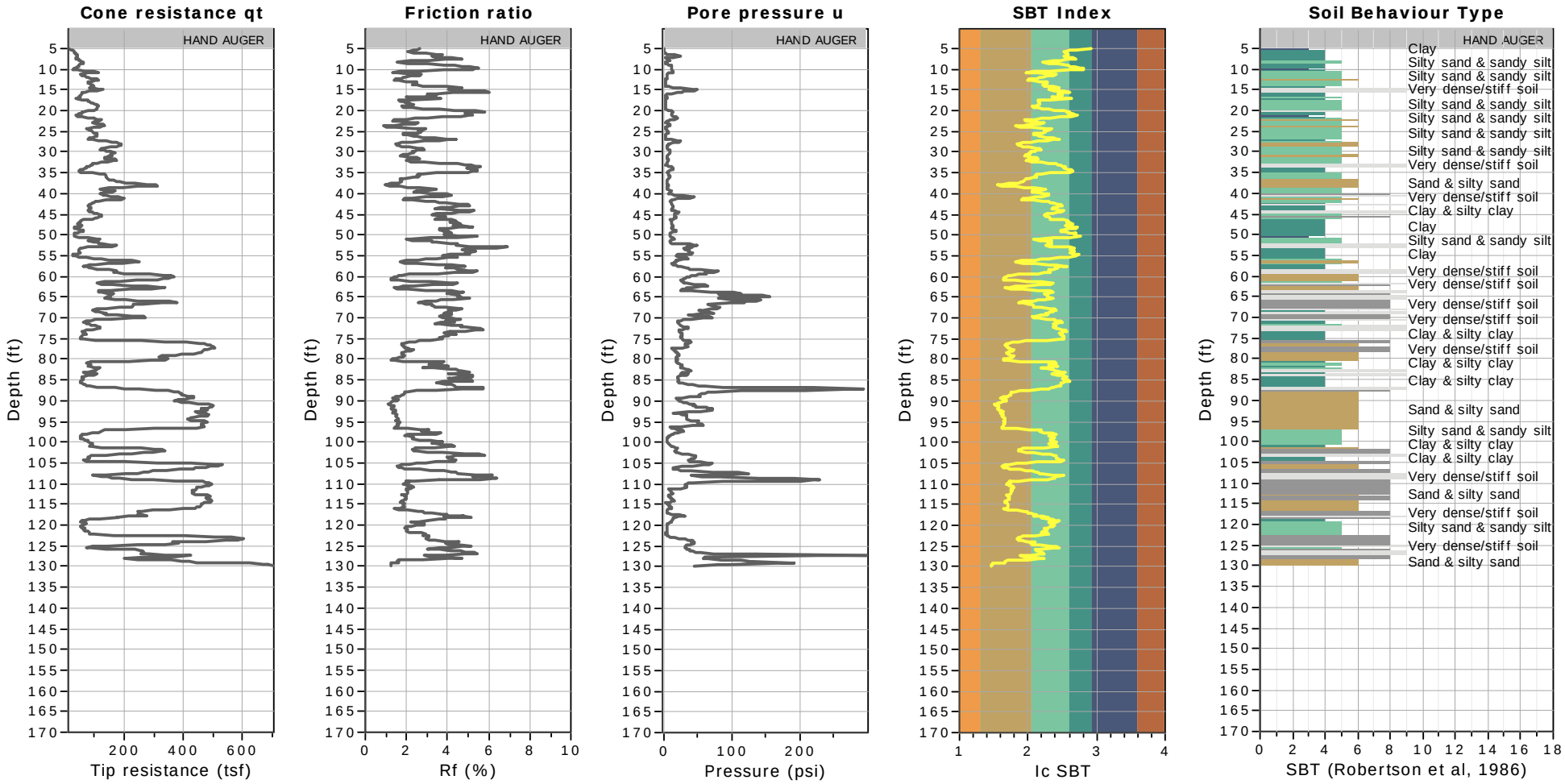
Total depth: 129.76 ft

Surface Elevation: 334.04 ft

Coords: X:6165396.03, Y:2399948.84

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0285ACPT

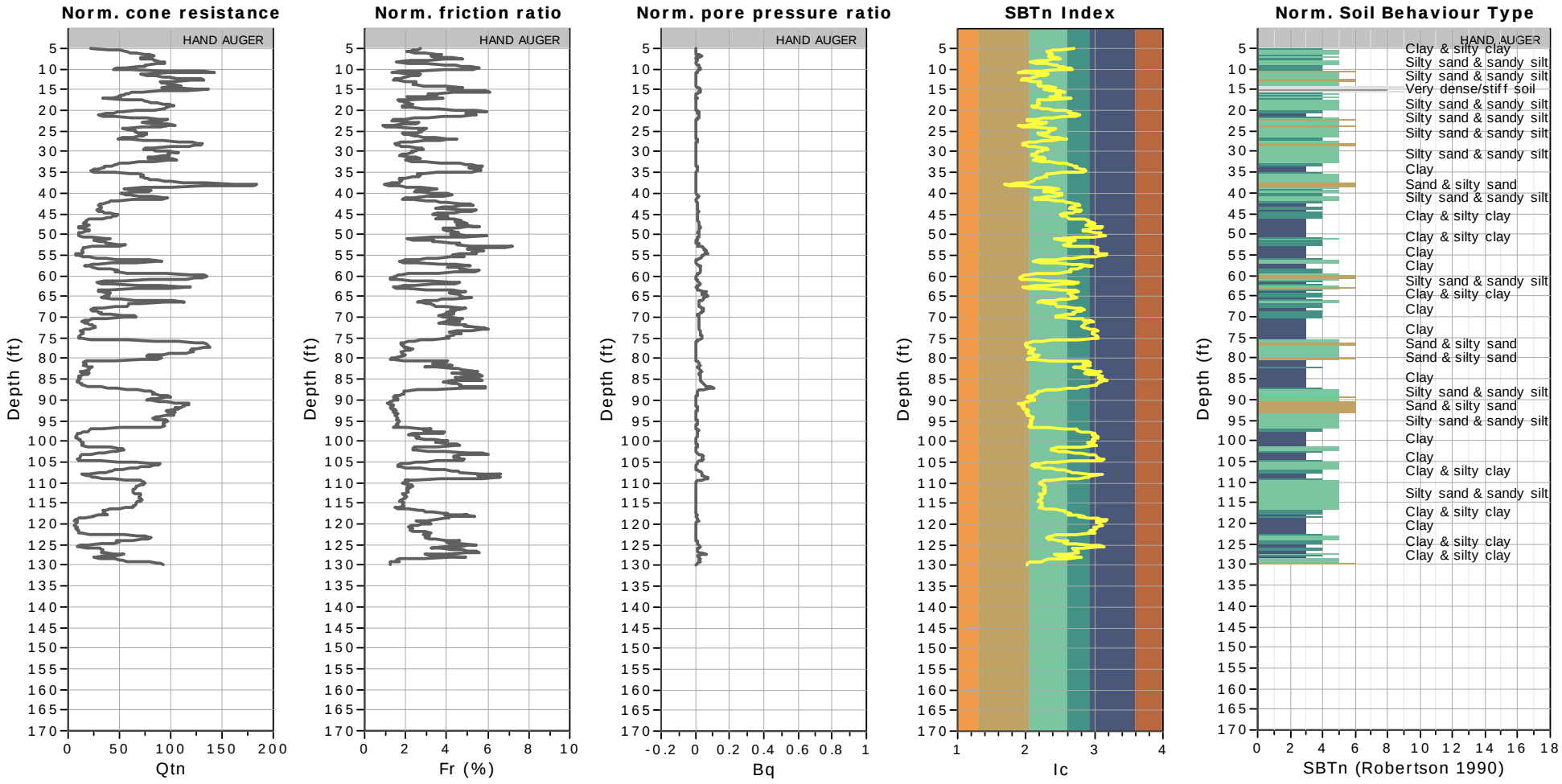
Total depth: 129.76 ft

Surface Elevation: 334.04 ft

Coords: X:6165396.03, Y:2399948.84

Project: California High-Speed Train

Location: Fresno-Bakersfield

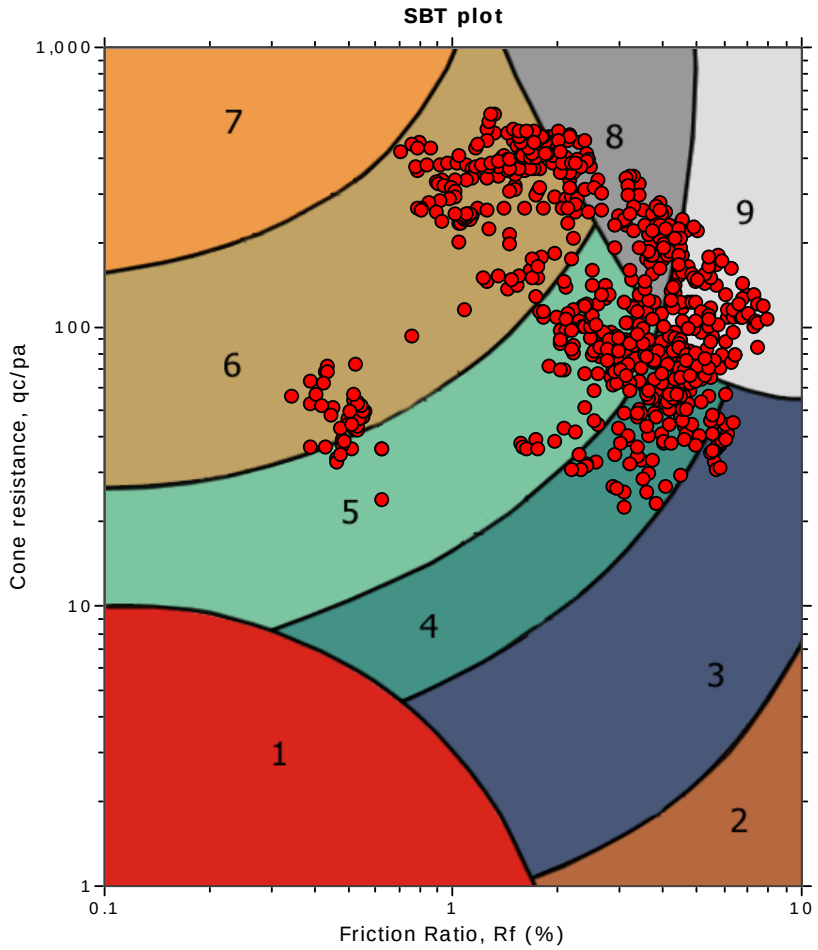


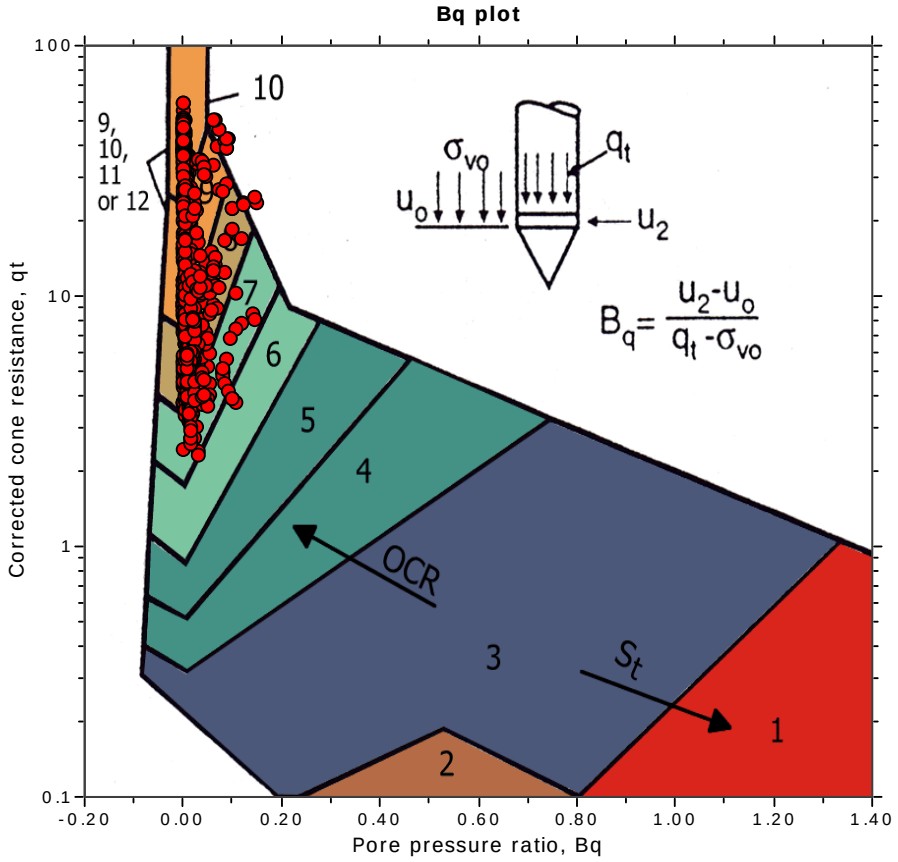
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0287CPT
Total depth: 123.36 ft
Surface Elevation: 337.10 ft
Coords: X:6165842.80, Y:2397303.17

SBT - Bq plots





SBT legend

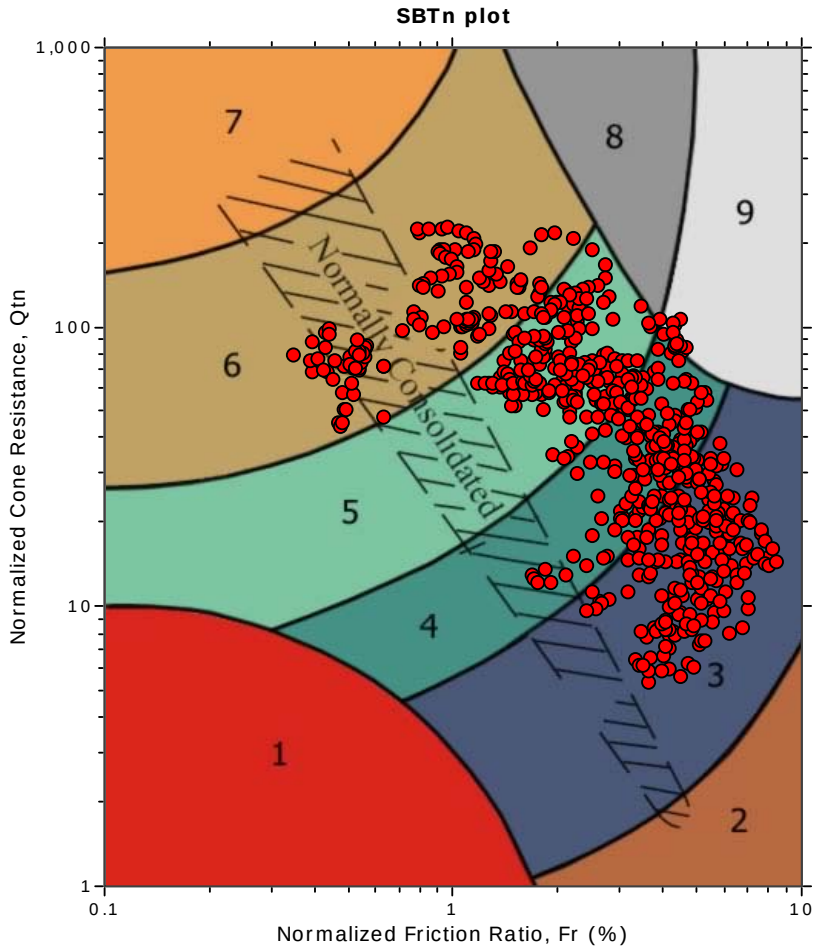
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

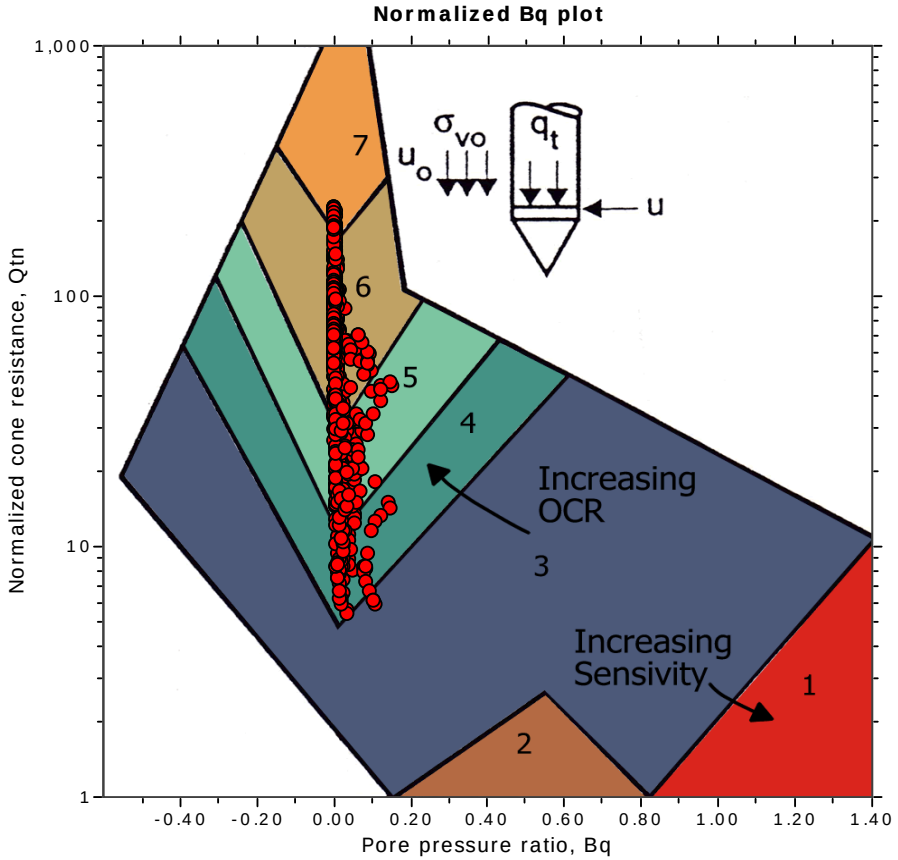
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0287CPT
Total depth: 123.36 ft
Surface Elevation: 337.10 ft
Coords: X:6165842.80, Y:2397303.17

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0287CPT

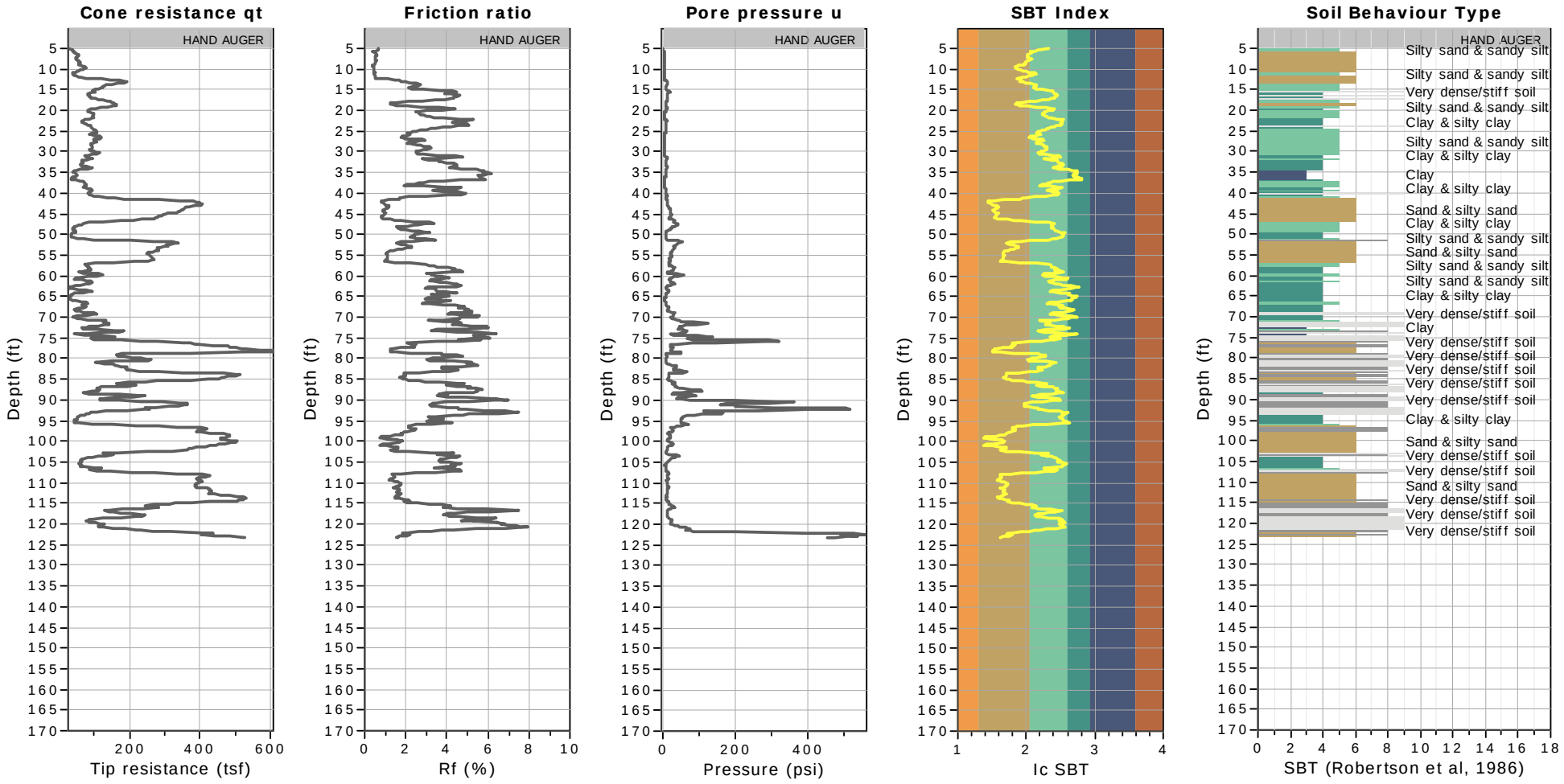
Total depth: 123.36 ft

Surface Elevation: 337.10 ft

Coords: X:6165842.80, Y:2397303.17

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0287CPT

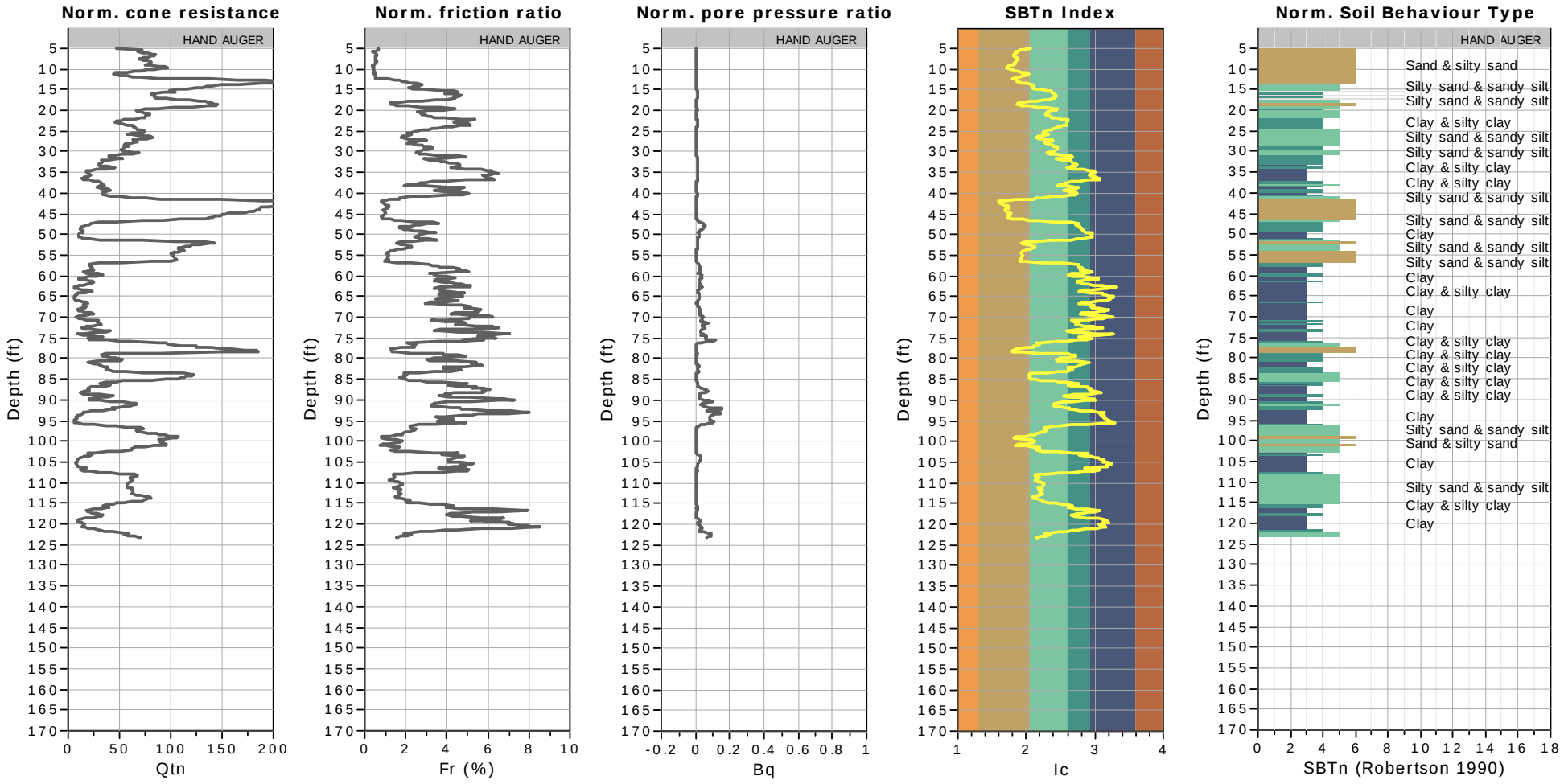
Total depth: 123.36 ft

Surface Elevation: 337.10 ft

Coords: X:6165842.80, Y:2397303.17

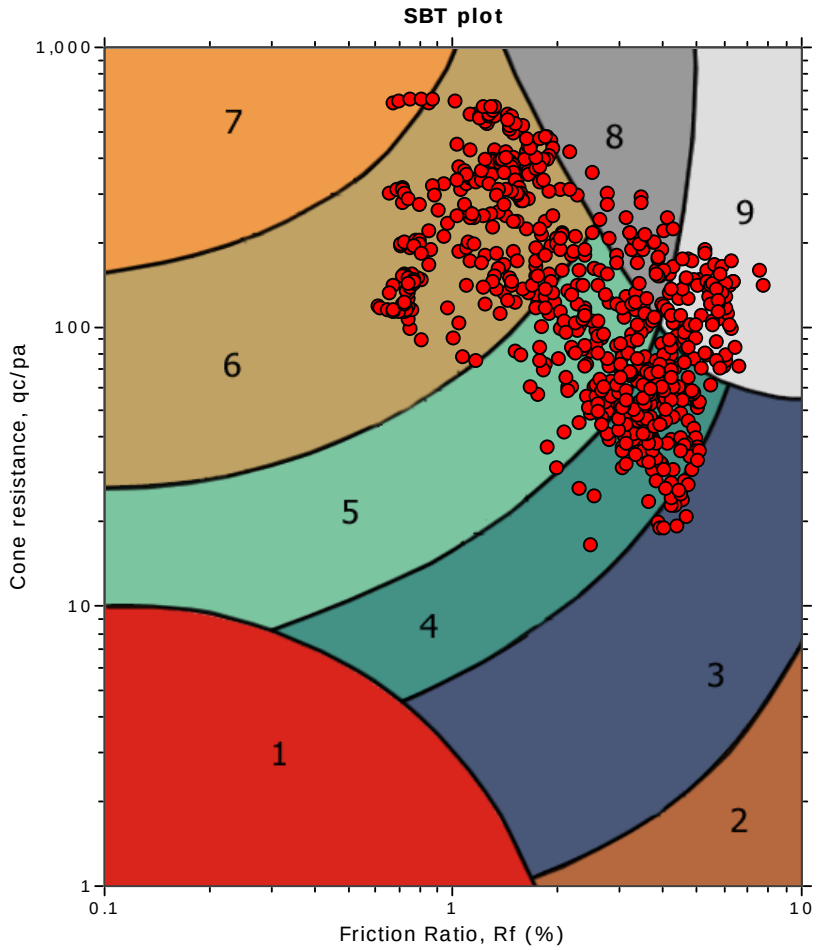
Project: California High-Speed Train

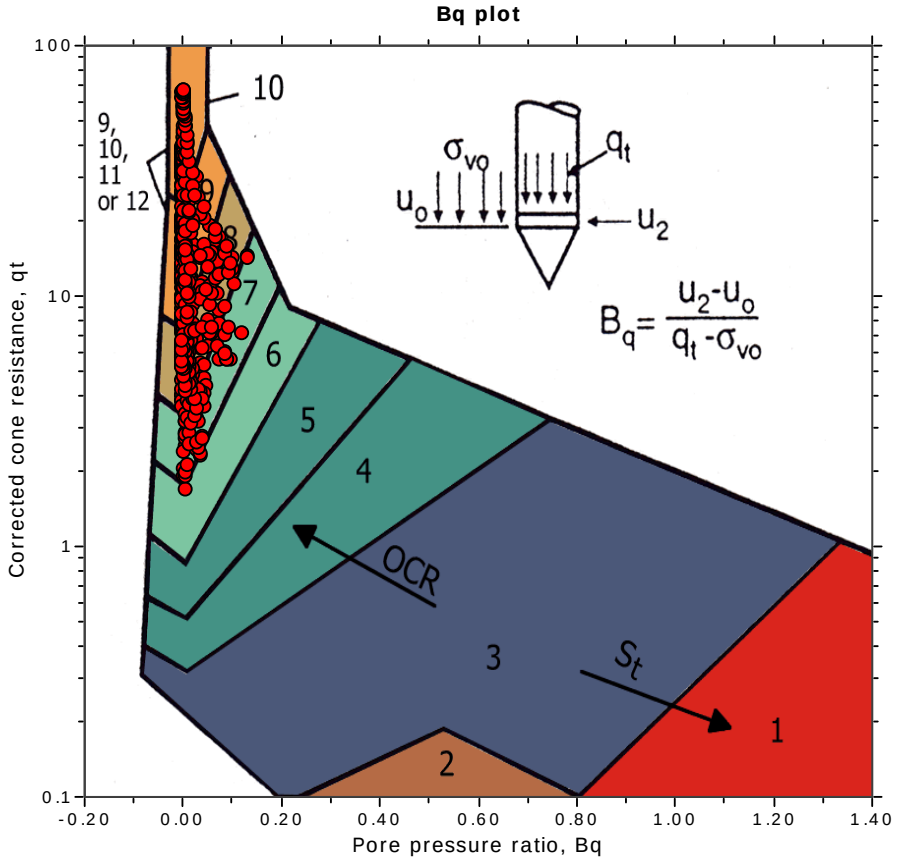
Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



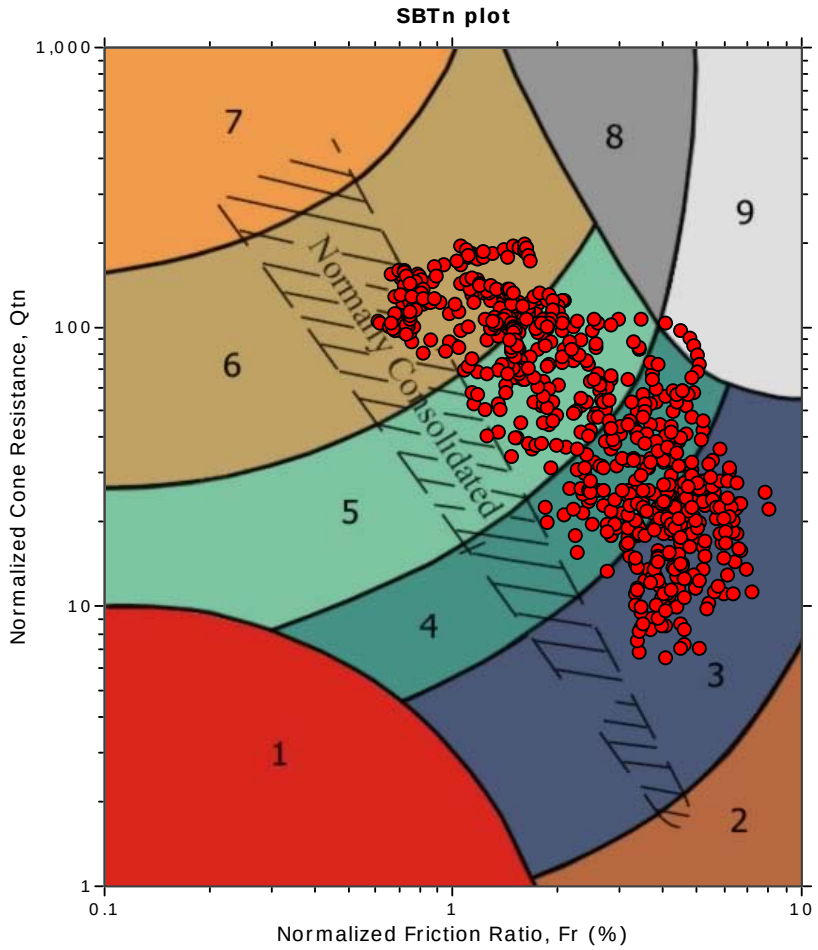


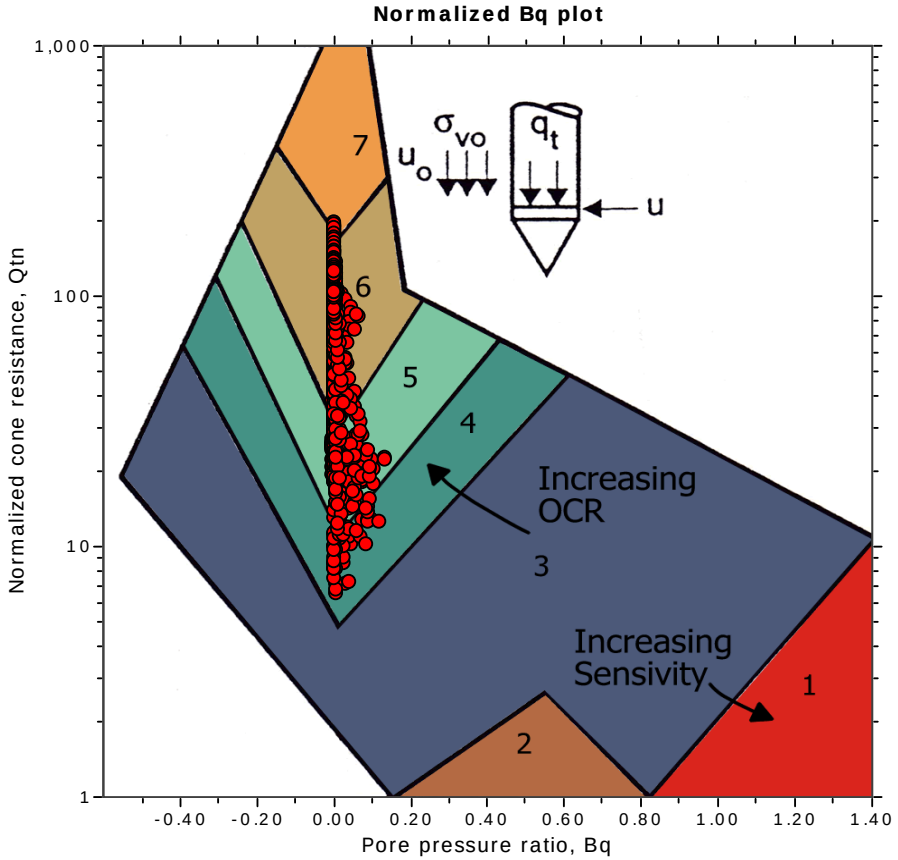
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0289CPT

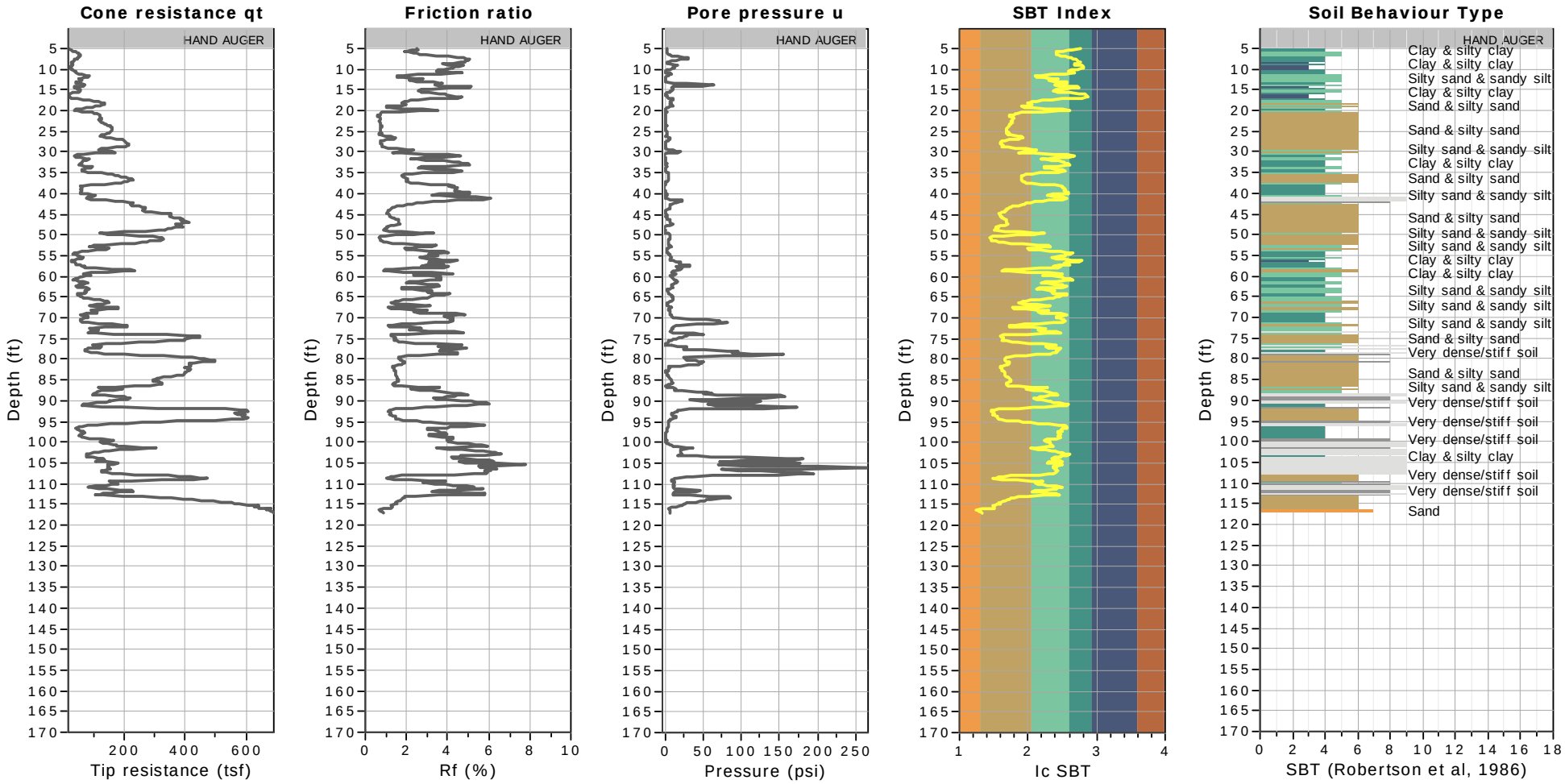
Total depth: 116.96 ft

Surface Elevation: 337.22 ft

Coords: X:6165600.84, Y:2395383.81

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

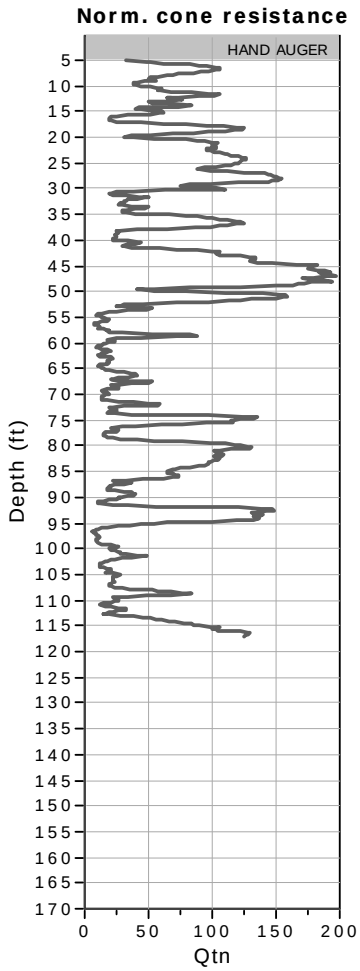
Location: Fresno-Bakersfield

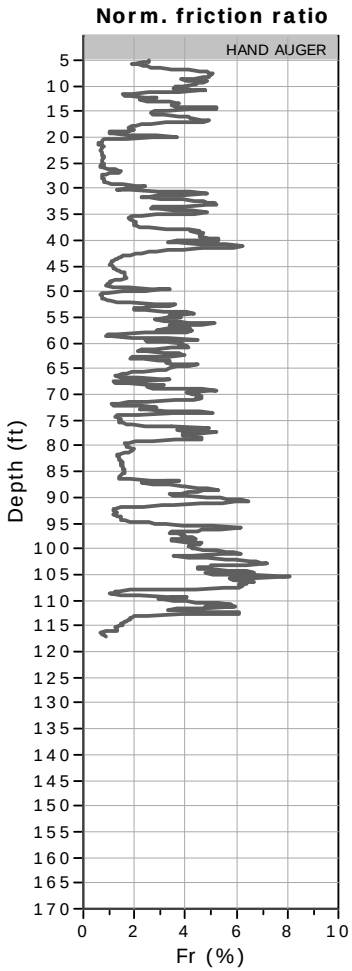
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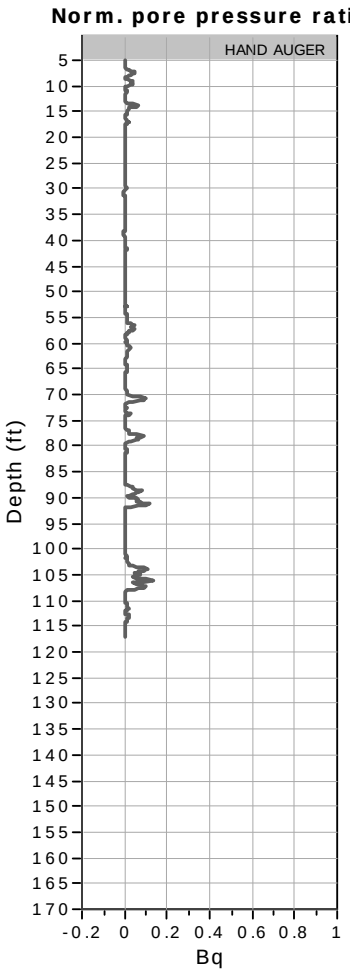
Total depth: 116.96 ft

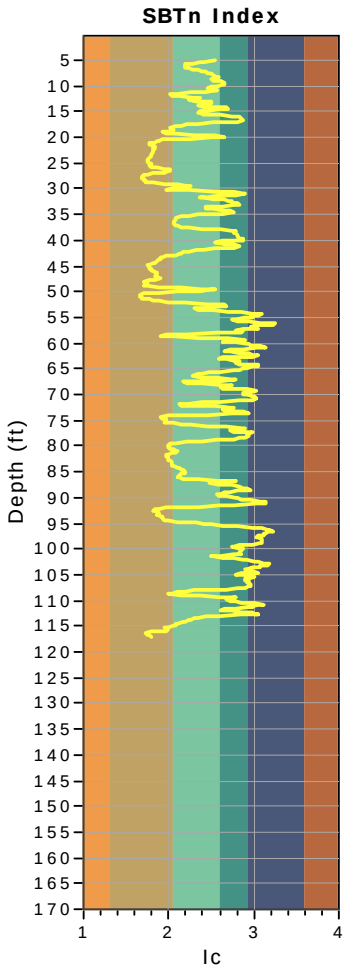
Surface Elevation: 337.22 ft

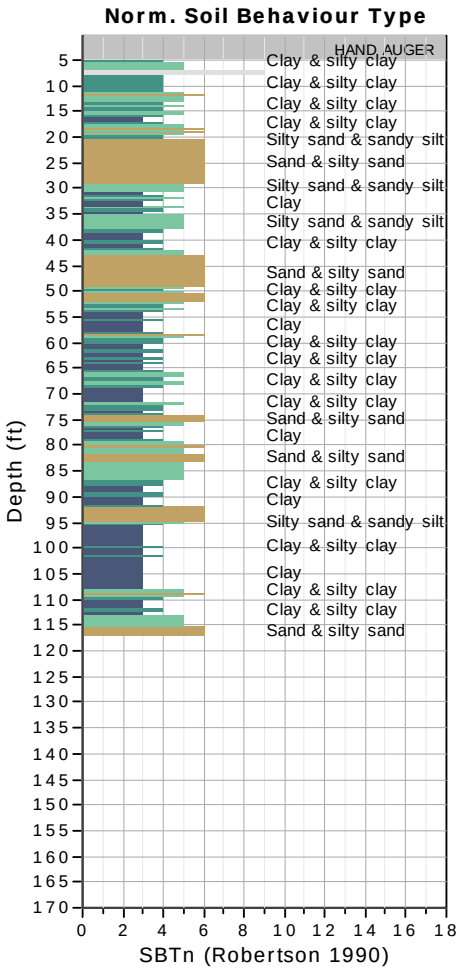
Coords: X:6165600.84, Y:2395383.81











RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBTn legend

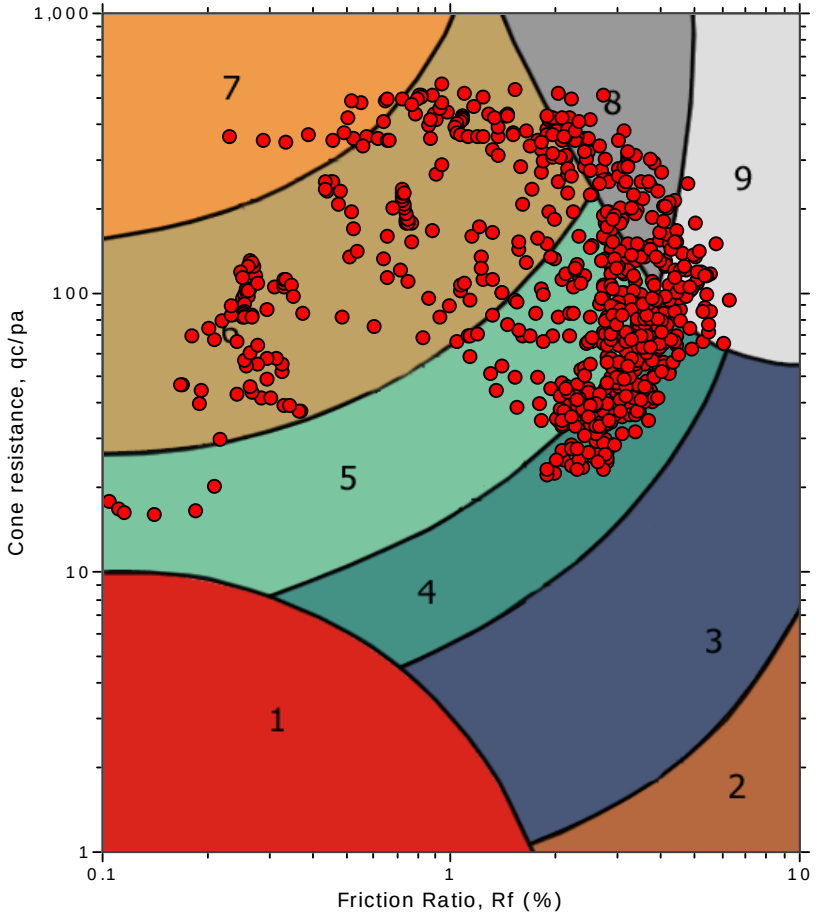
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

Project: California High-Speed Train
Location: Fresno-Bakersfield

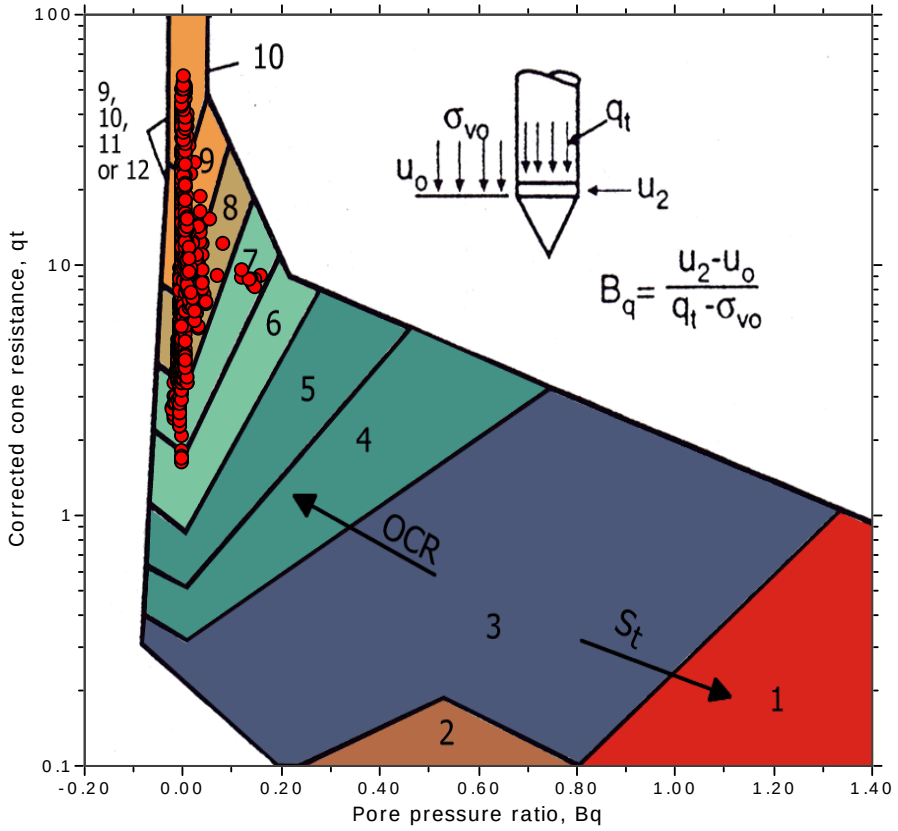
CPT: S0290ACPT
Total depth: 124.67 ft
Surface Elevation: 332.78 ft
Coords: X:6166346.39, Y:2392155.00

SBT - Bq plots

SBT plot



Bq plot

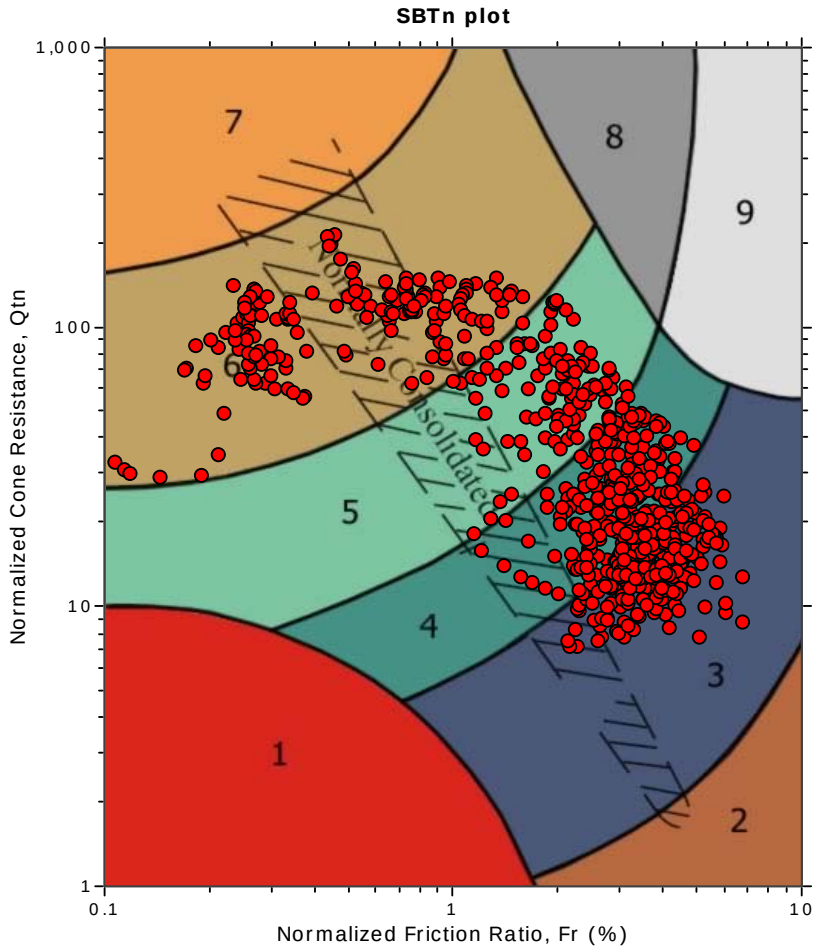


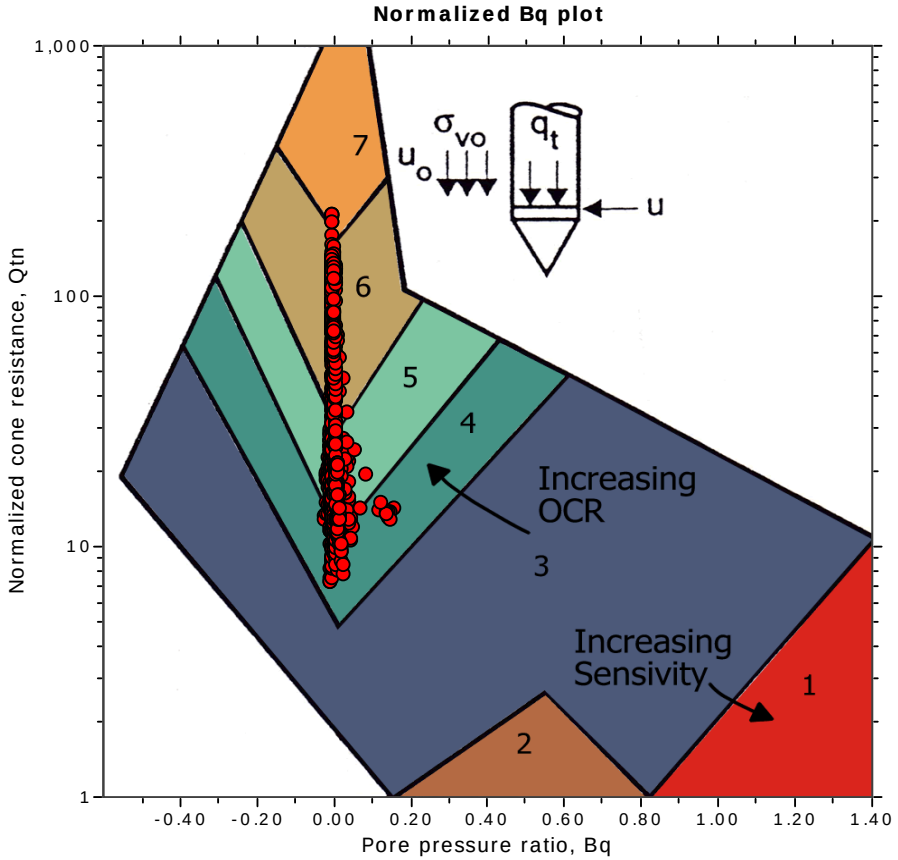
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0290ACPT

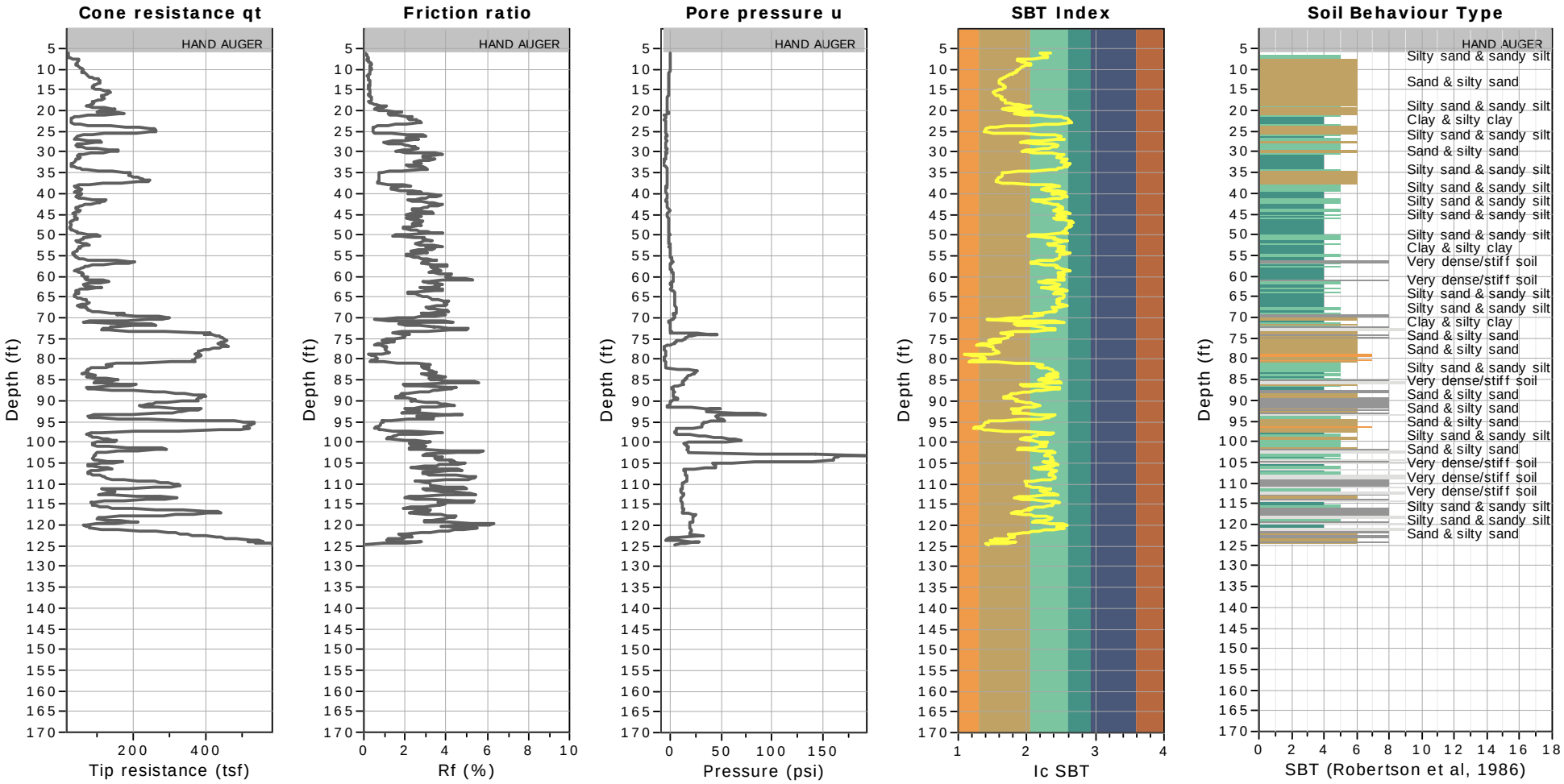
Total depth: 124.67 ft

Surface Elevation: 332.78 ft

Coords: X:6166346.39, Y:2392155.00

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0290ACPT

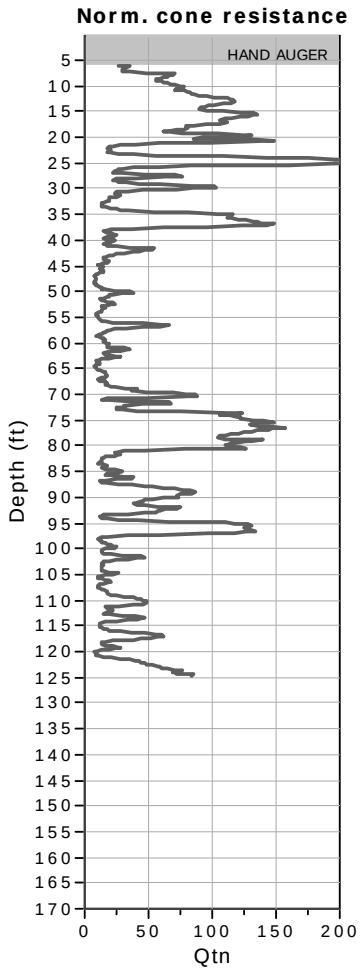
Total depth: 124.67 ft

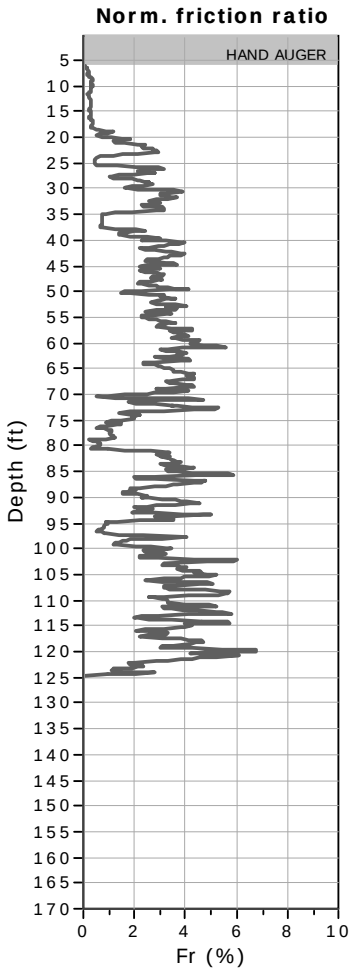
Surface Elevation: 332.78 ft

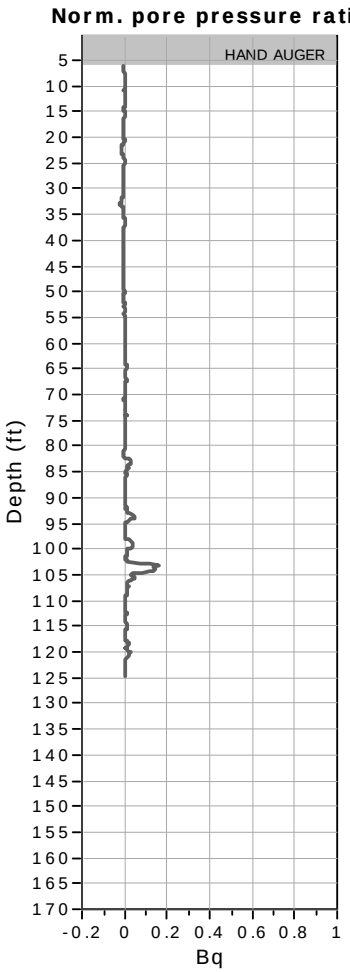
Coords: X:6166346.39, Y:2392155.00

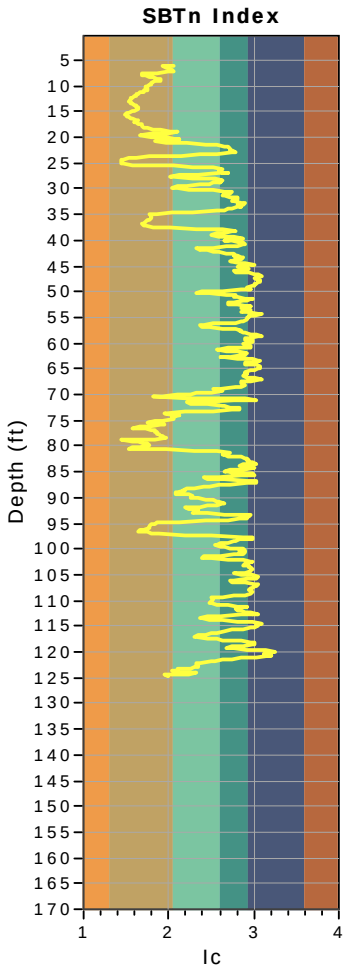
Project: California High-Speed Train

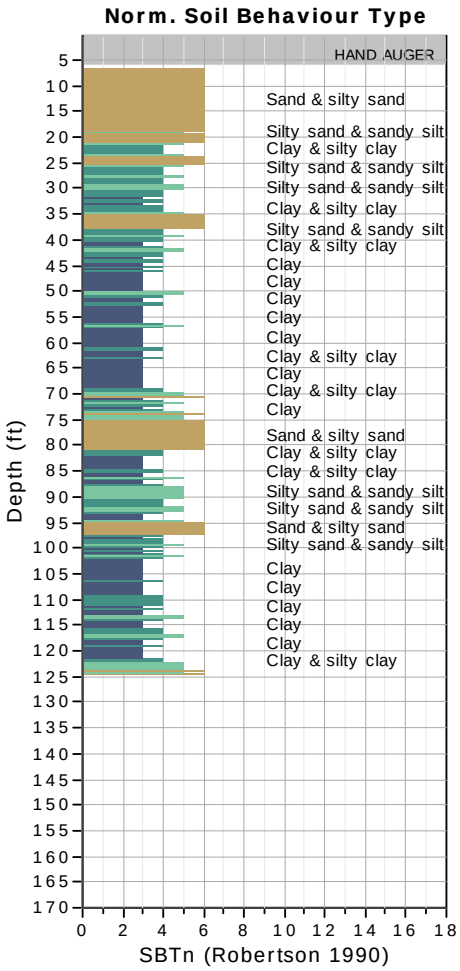
Location: Fresno-Bakersfield









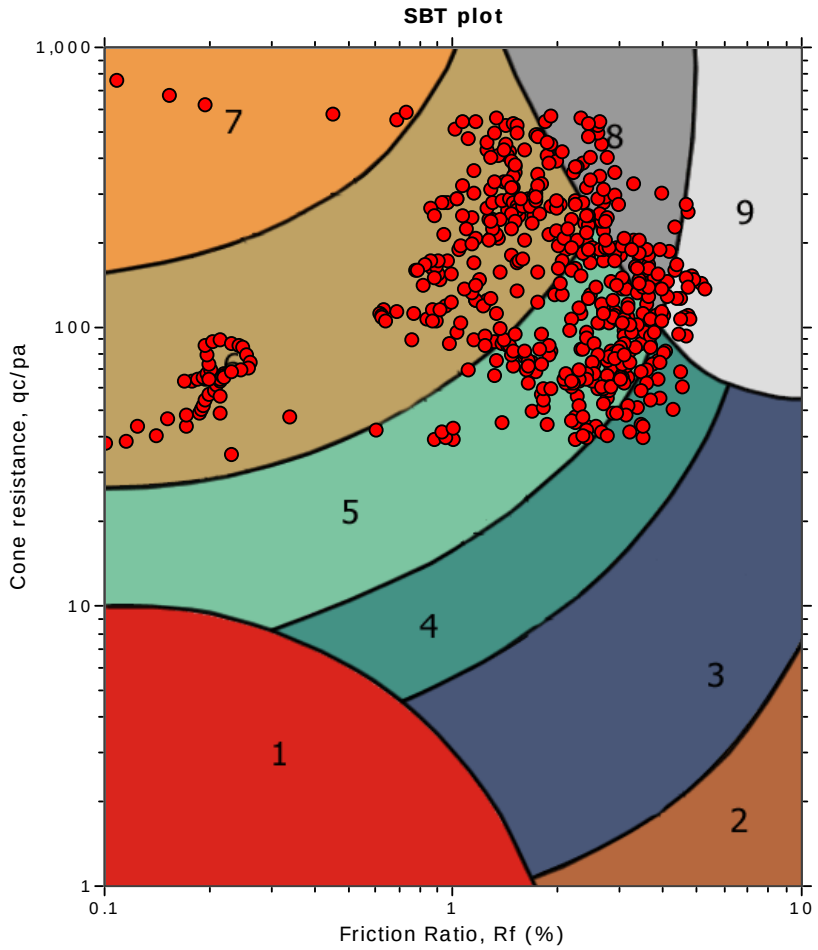


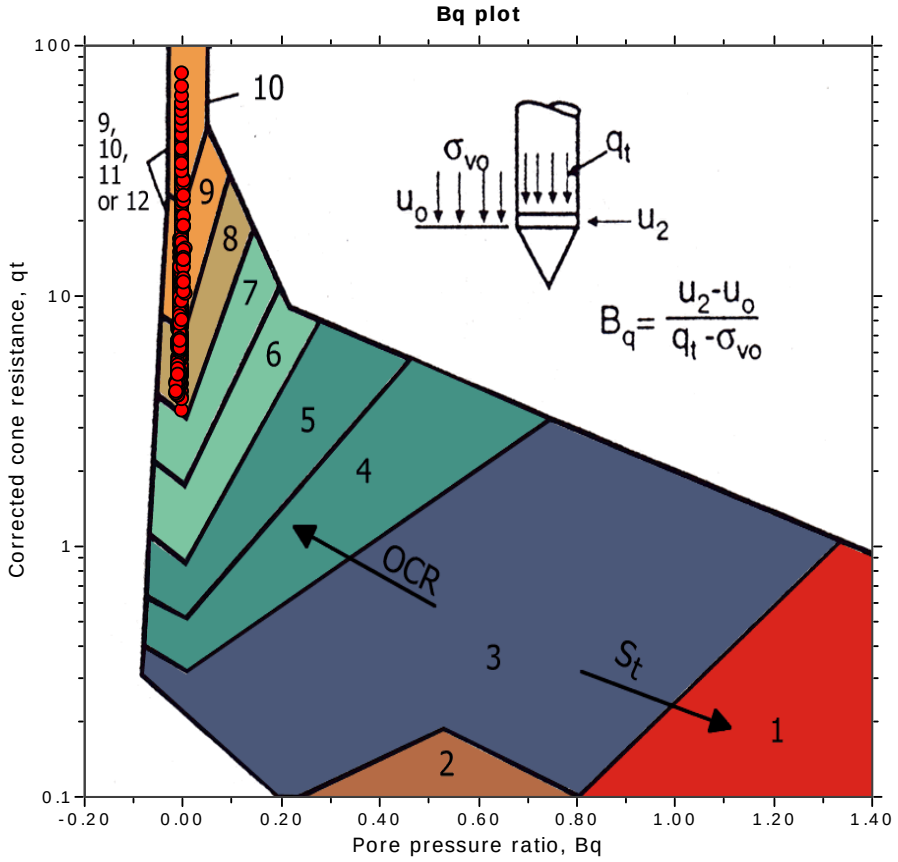
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots





SBT legend

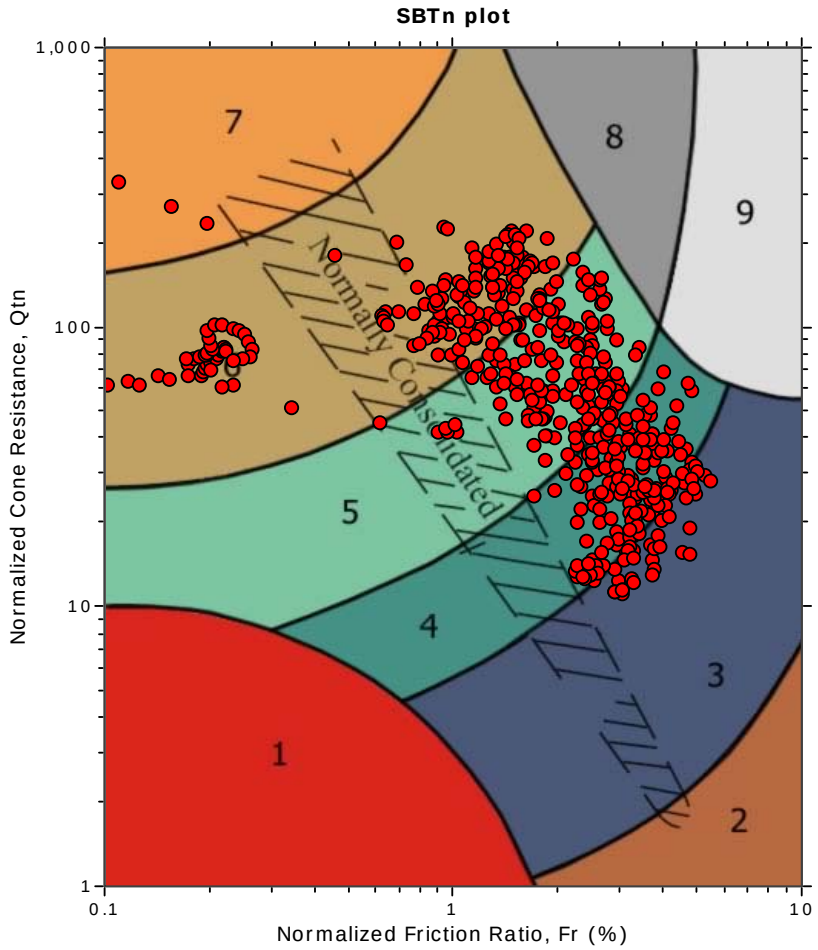
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

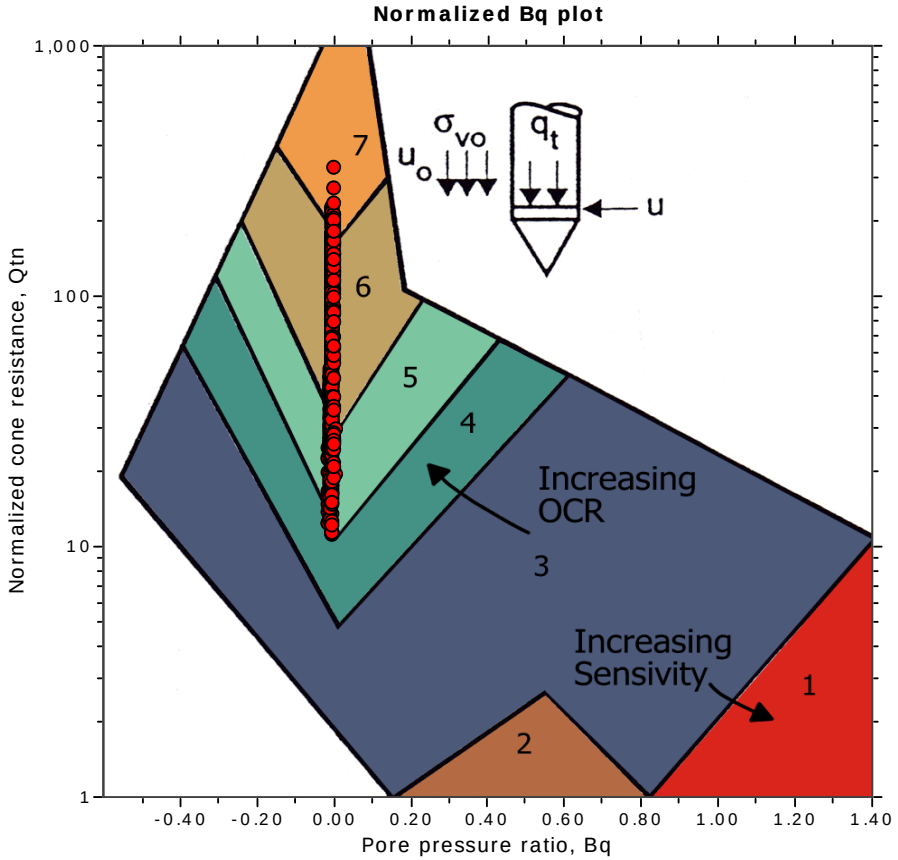
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0292CPT
Total depth: 94.16 ft
Surface Elevation: 346.88 ft
Coords: X:6167686.10, Y:2386520.76

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0292CPT

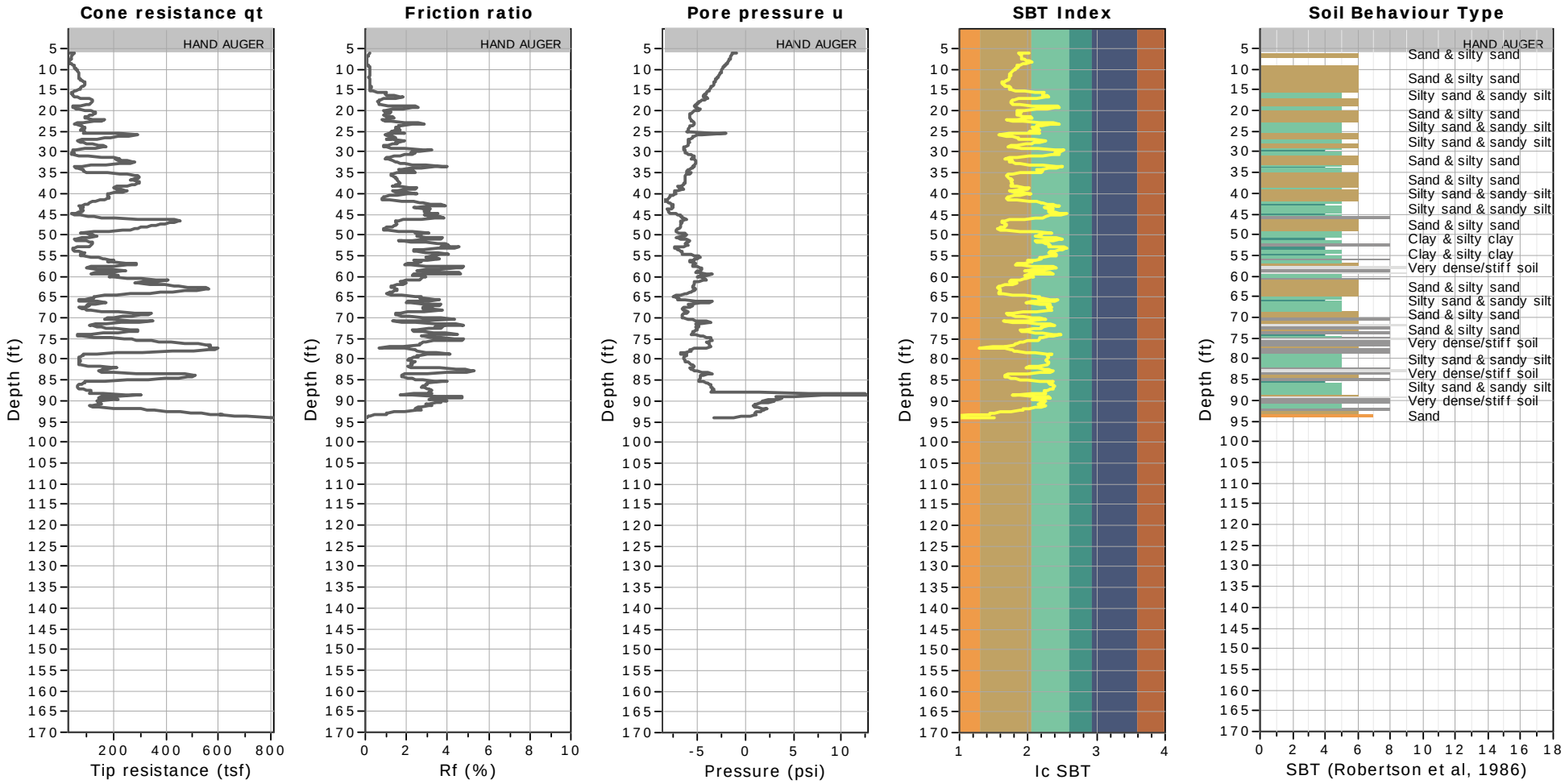
Total depth: 94.16 ft

Surface Elevation: 346.88 ft

Coords: X:6167686.10, Y:2386520.76

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0292CPT

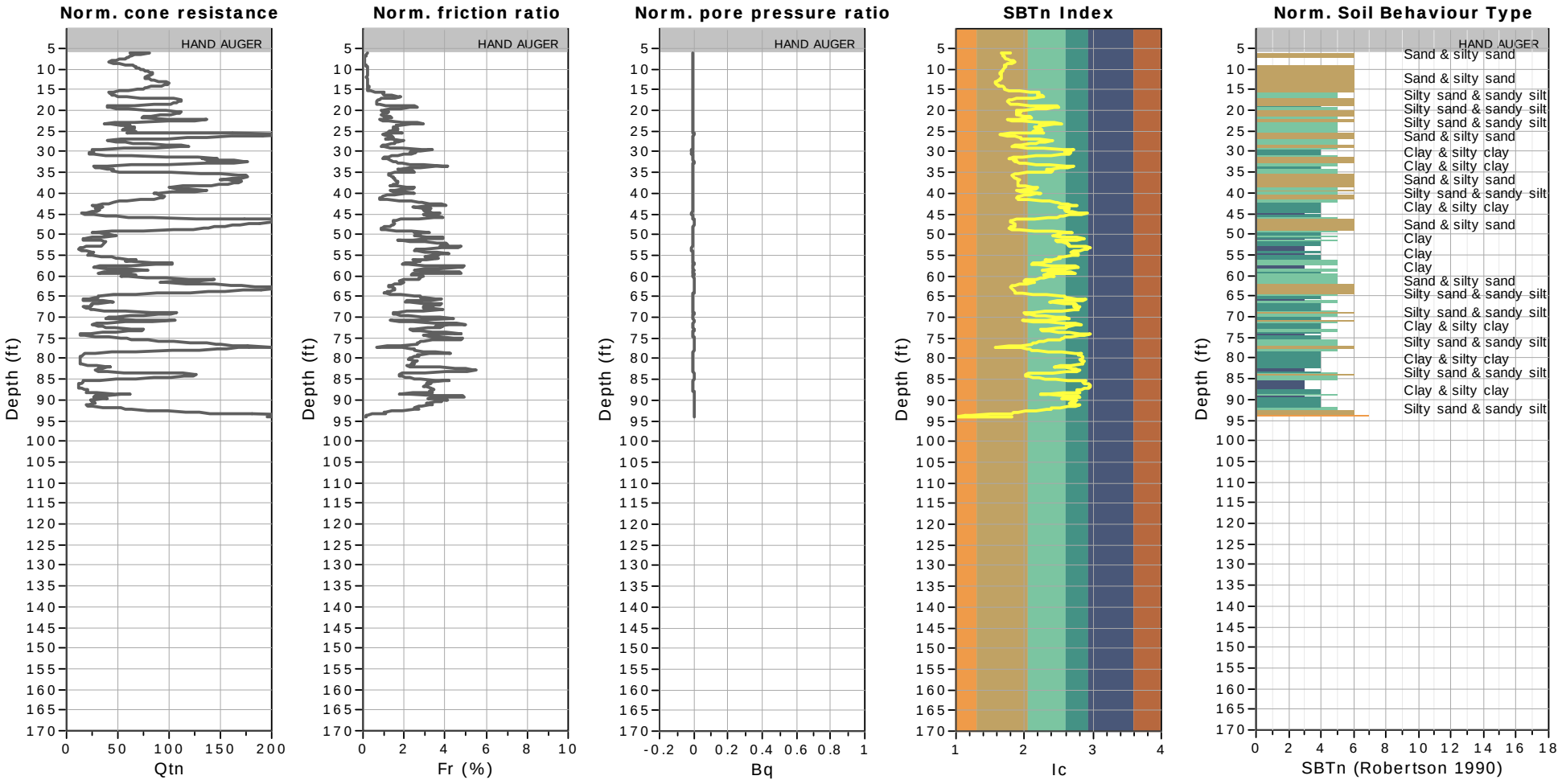
Total depth: 94.16 ft

Surface Elevation: 346.88 ft

Coords: X:6167686.10, Y:2386520.76

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

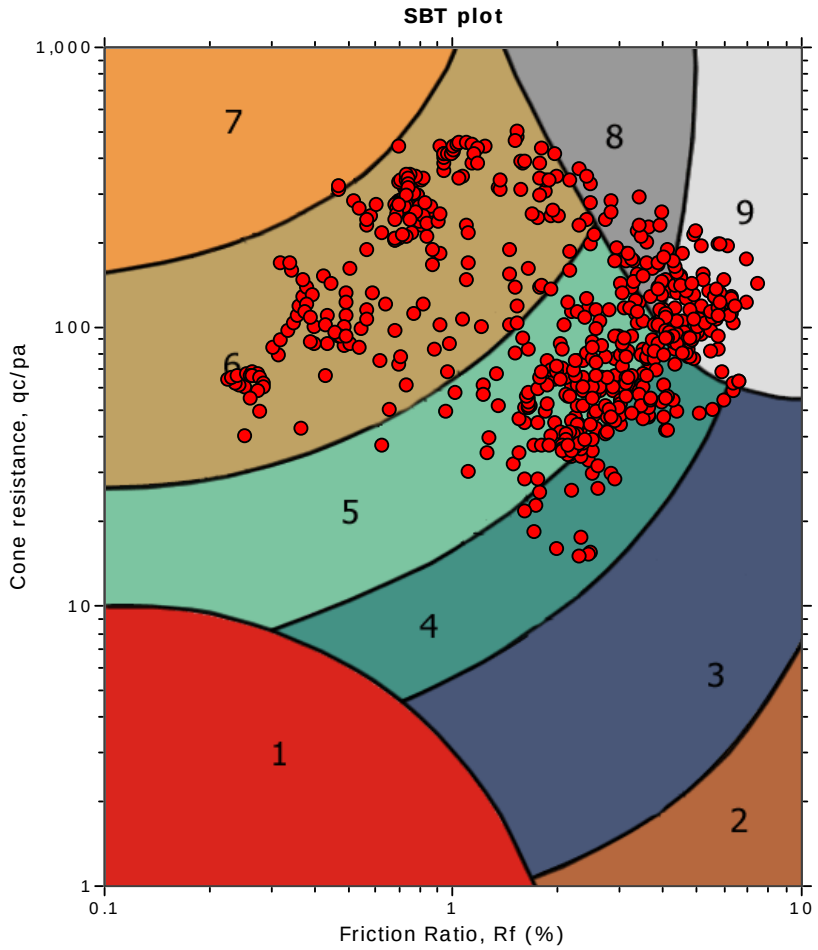
CPT: S0295CPT

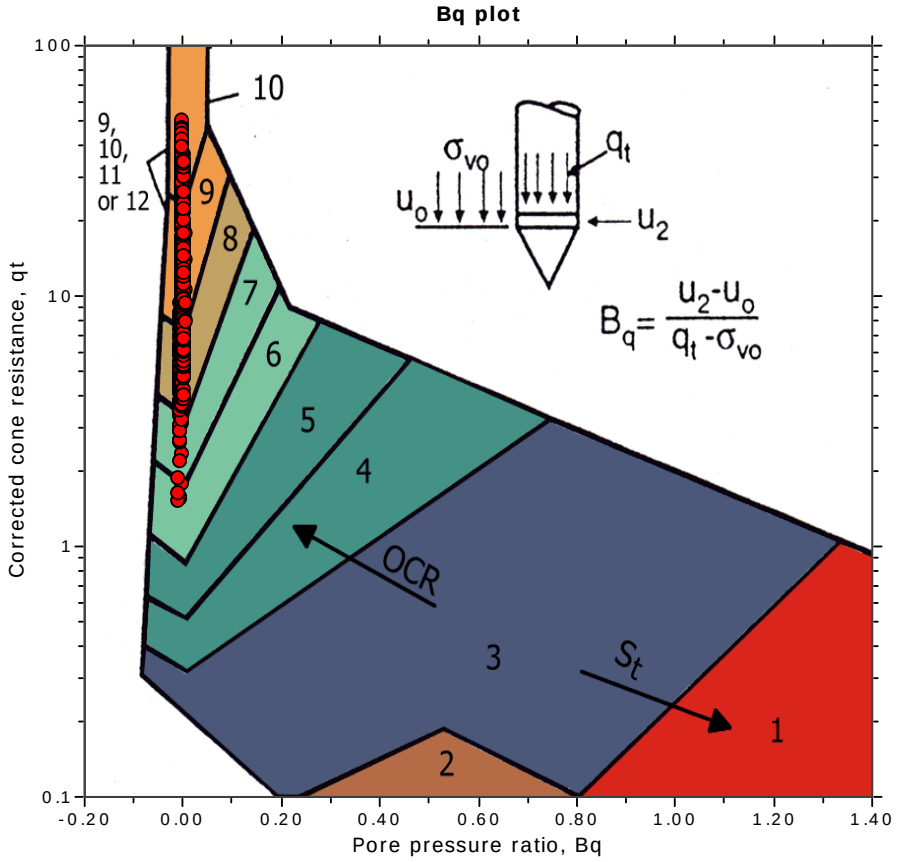
Total depth: 107.12 ft

Surface Elevation: 346.88 ft

Coords: X:6172215.38, Y:2382165.68

SBT - Bq plots





SBT legend

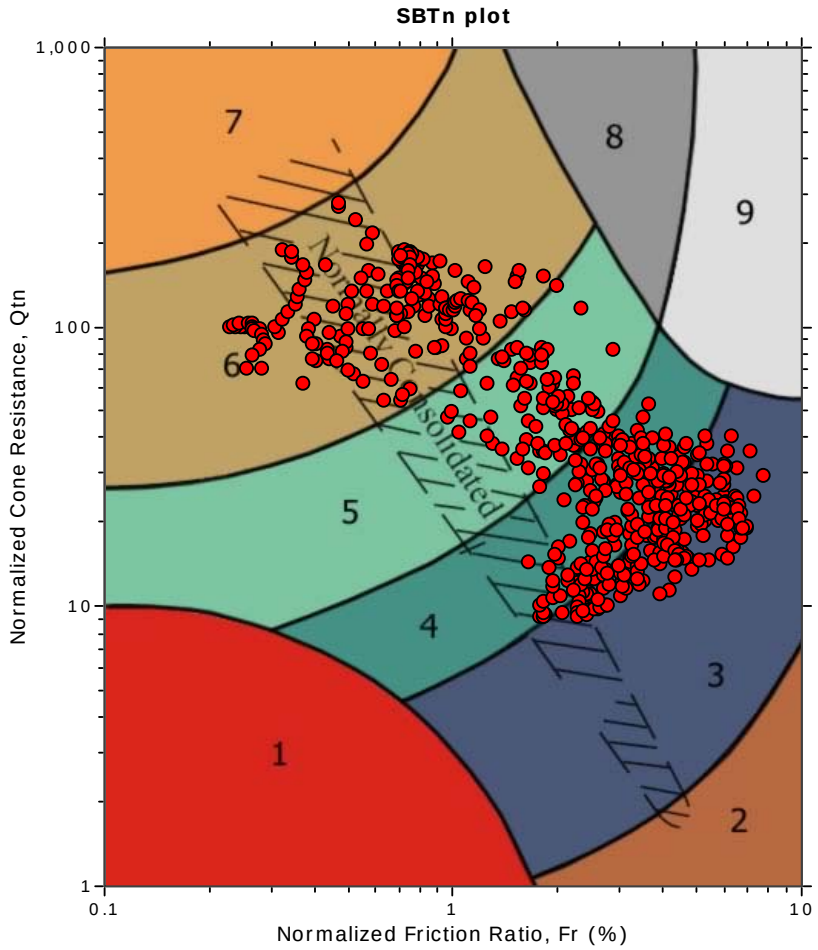
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

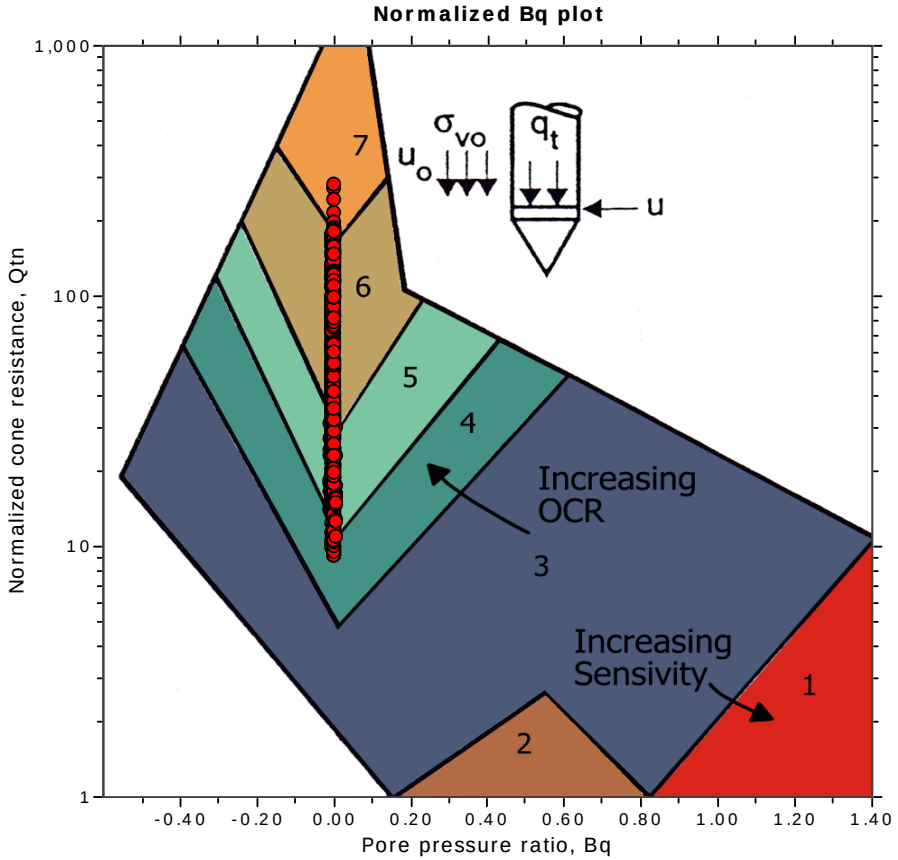
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0295CPT
Total depth: 107.12 ft
Surface Elevation: 346.88 ft
Coords: X:6172215.38, Y:2382165.68

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

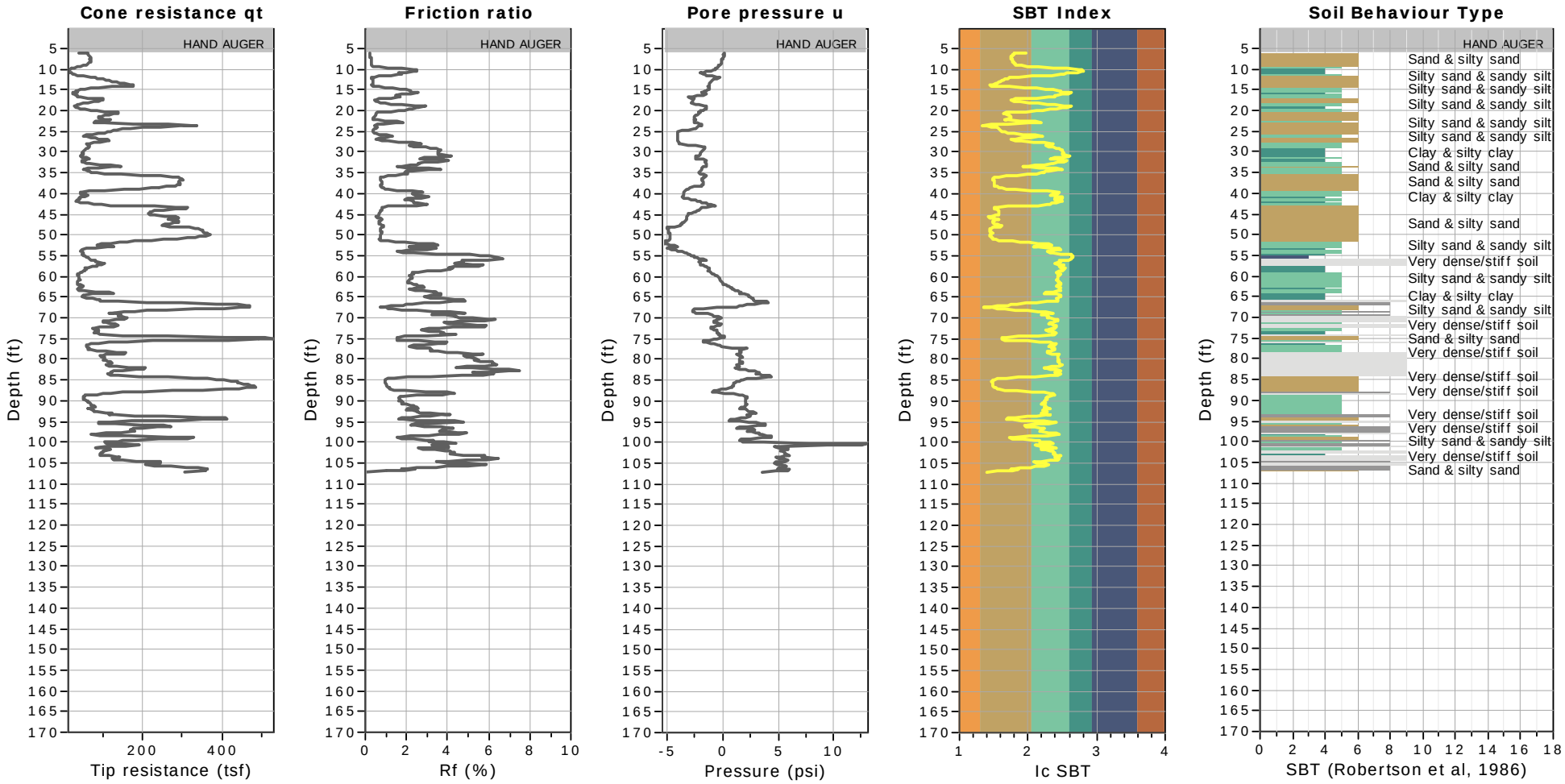
Location: Fresno-Bakersfield

CPT: S0295CPT

Total depth: 107.12 ft

Surface Elevation: 346.88 ft

Coords: X:6172215.38, Y:2382165.68



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

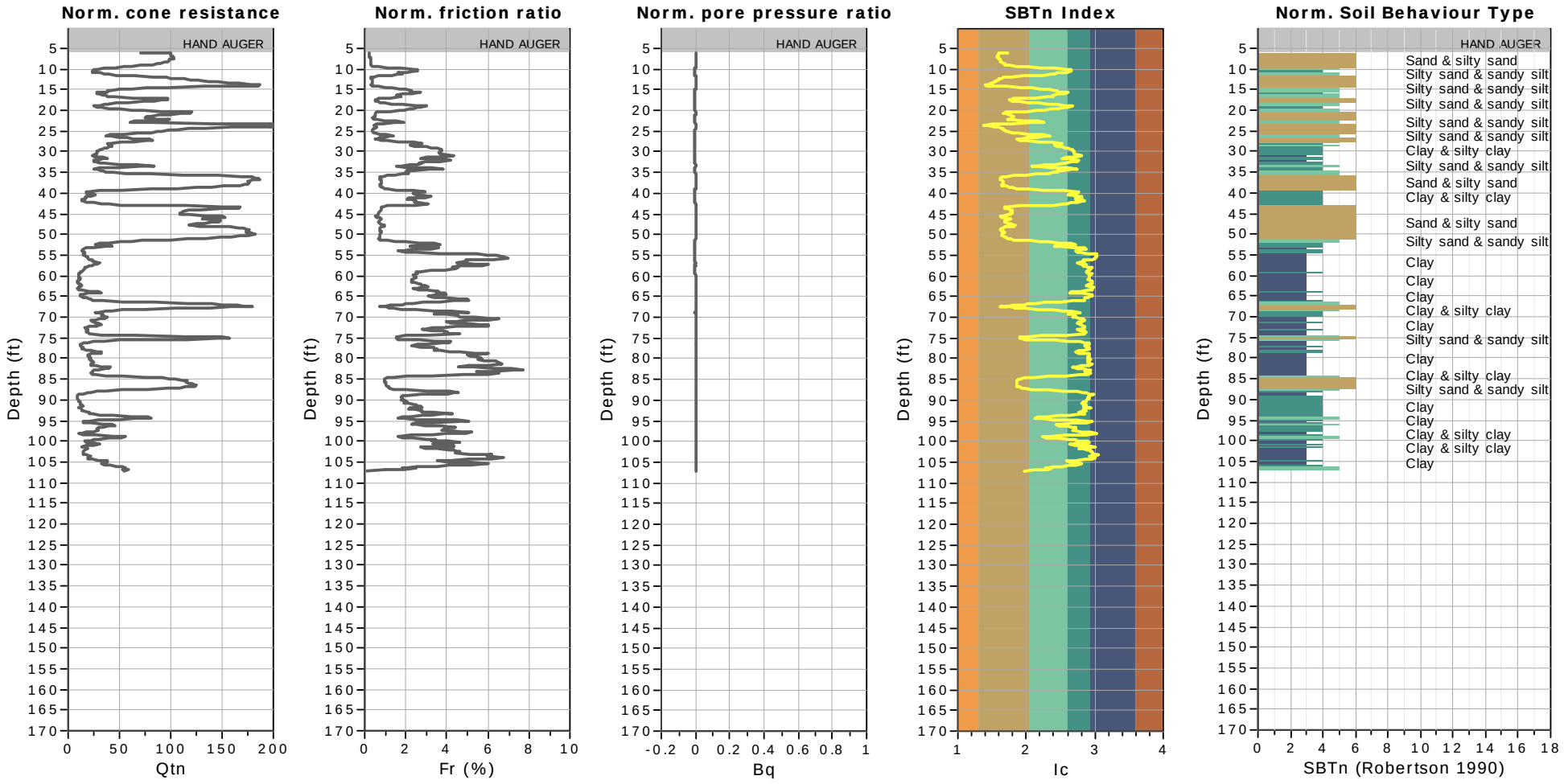
Location: Fresno-Bakersfield

CPT: S0295CPT

Total depth: 107.12 ft

Surface Elevation: 346.88 ft

Coords: X:6172215.38, Y:2382165.68

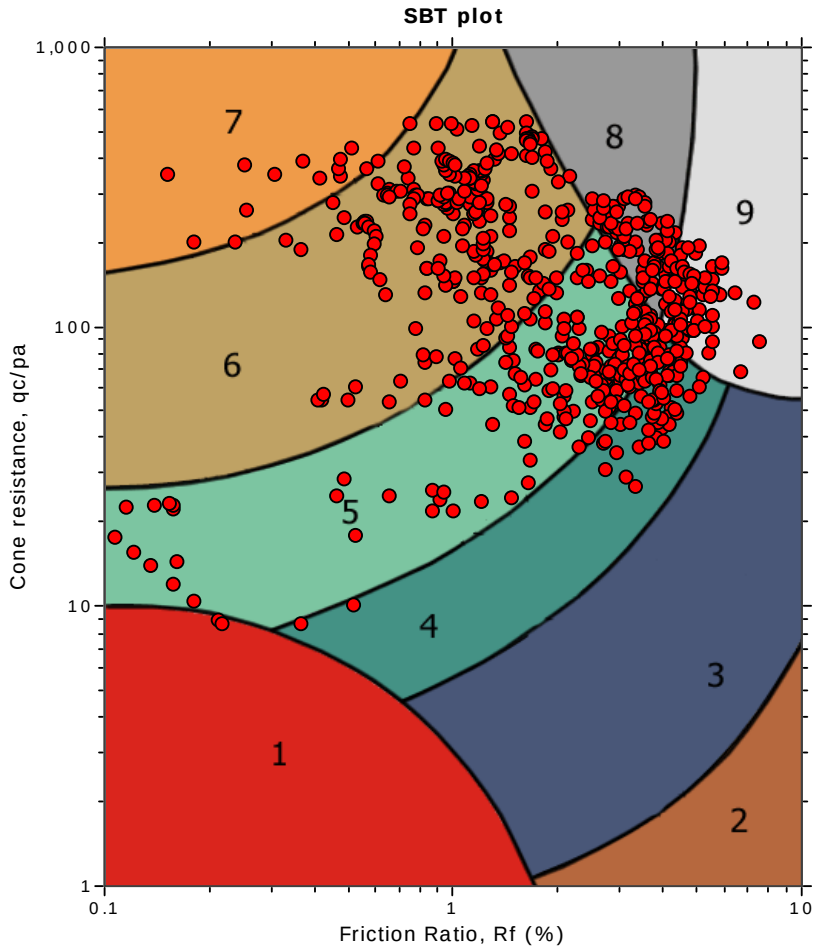


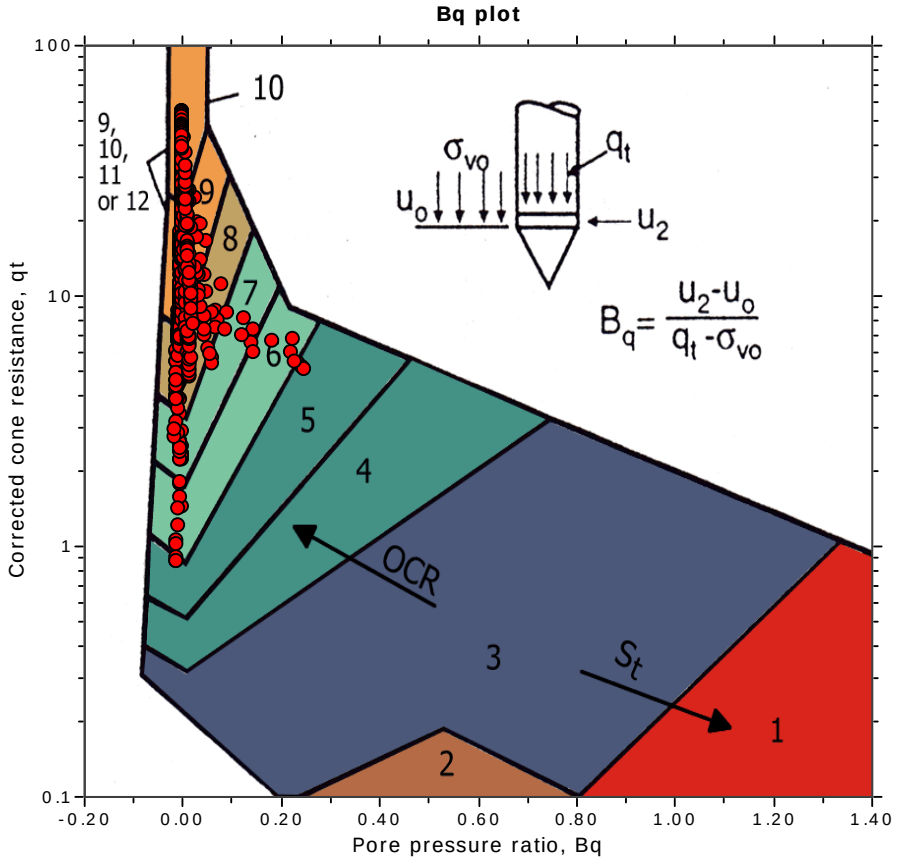
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0297CPT
Total depth: 110.24 ft
Surface Elevation: 345.85 ft
Coords: X:6176135.09, Y:2378676.86

SBT - Bq plots





SBT legend

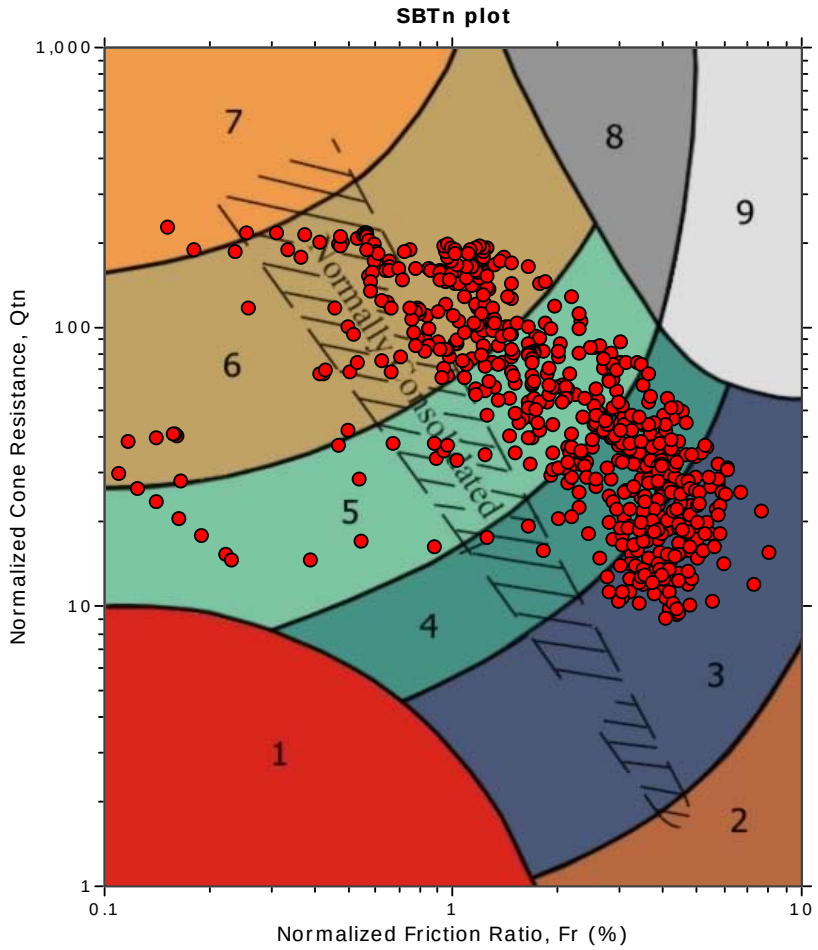
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

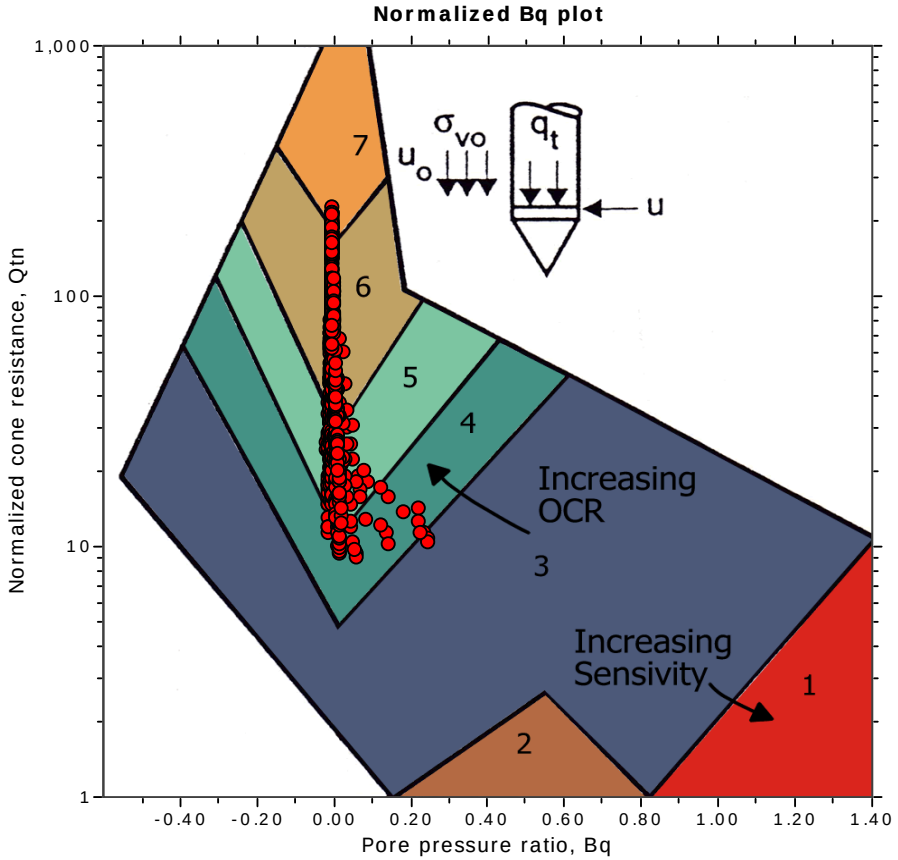
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0297CPT
Total depth: 110.24 ft
Surface Elevation: 345.85 ft
Coords: X:6176135.09, Y:2378676.86

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

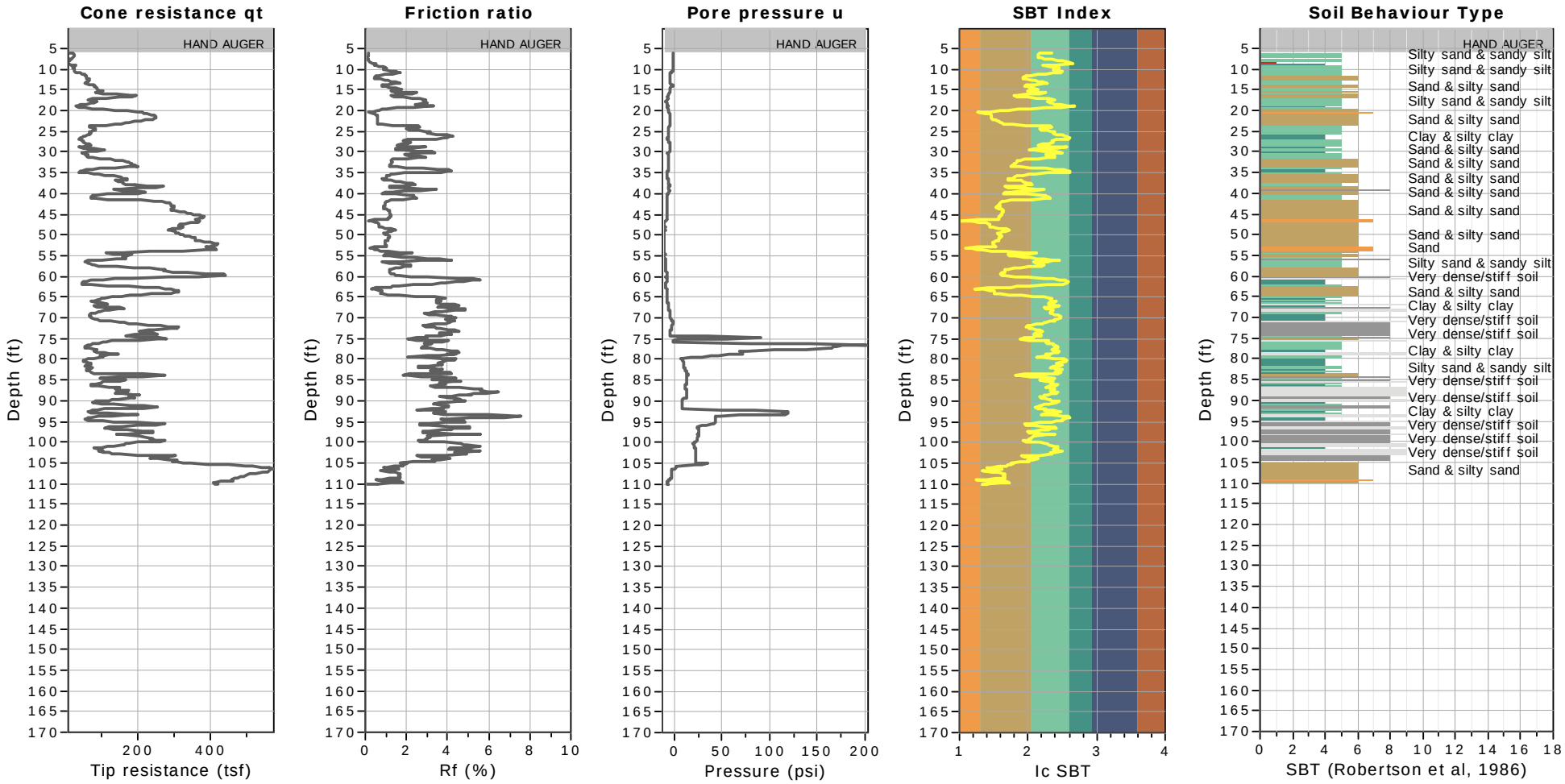
Location: Fresno-Bakersfield

CPT: S0297CPT

Total depth: 110.24 ft

Surface Elevation: 345.85 ft

Coords: X:6176135.09, Y:2378676.86



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0297CPT

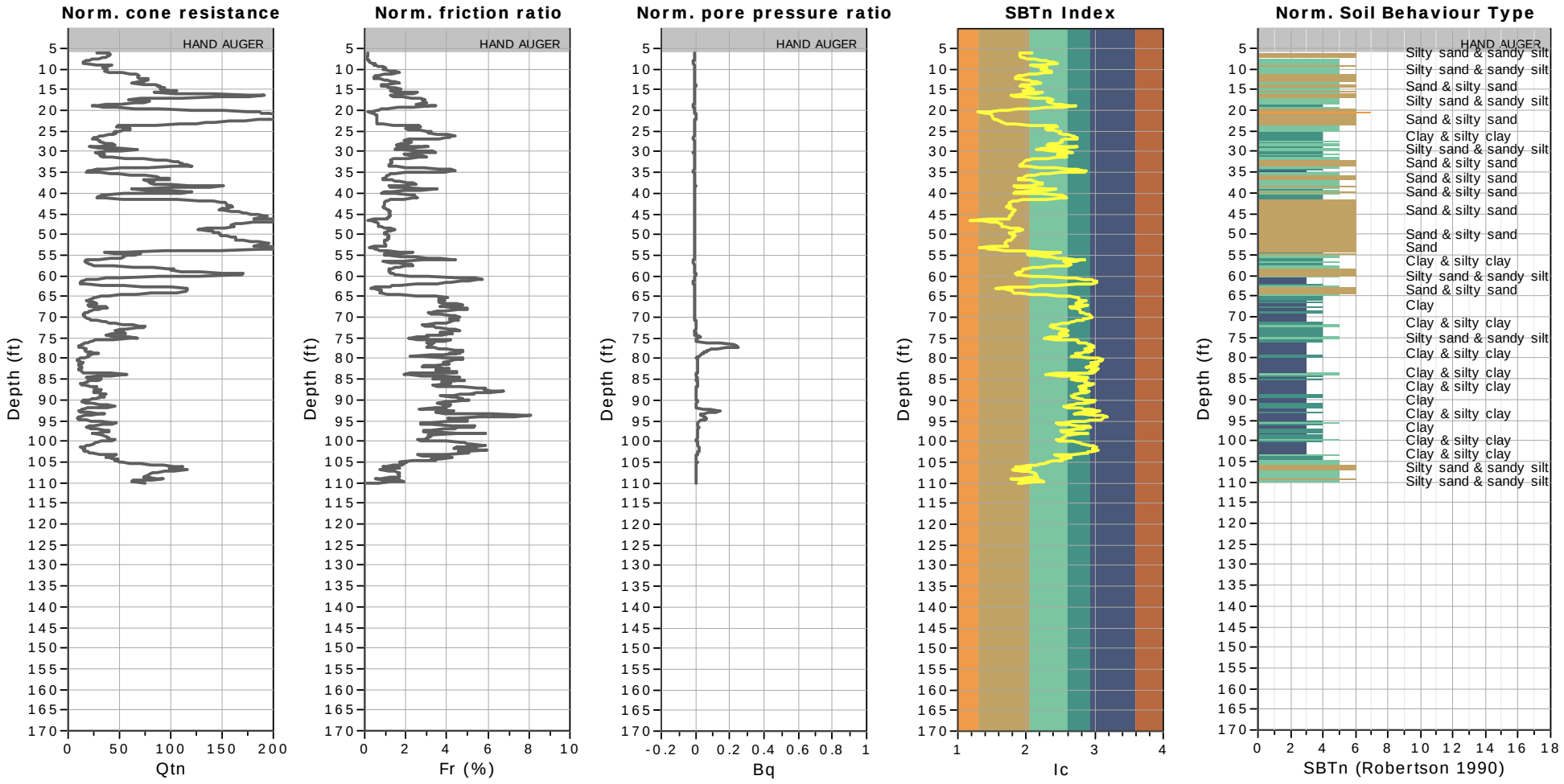
Total depth: 110.24 ft

Surface Elevation: 345.85 ft

Coords: X:6176135.09, Y:2378676.86

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

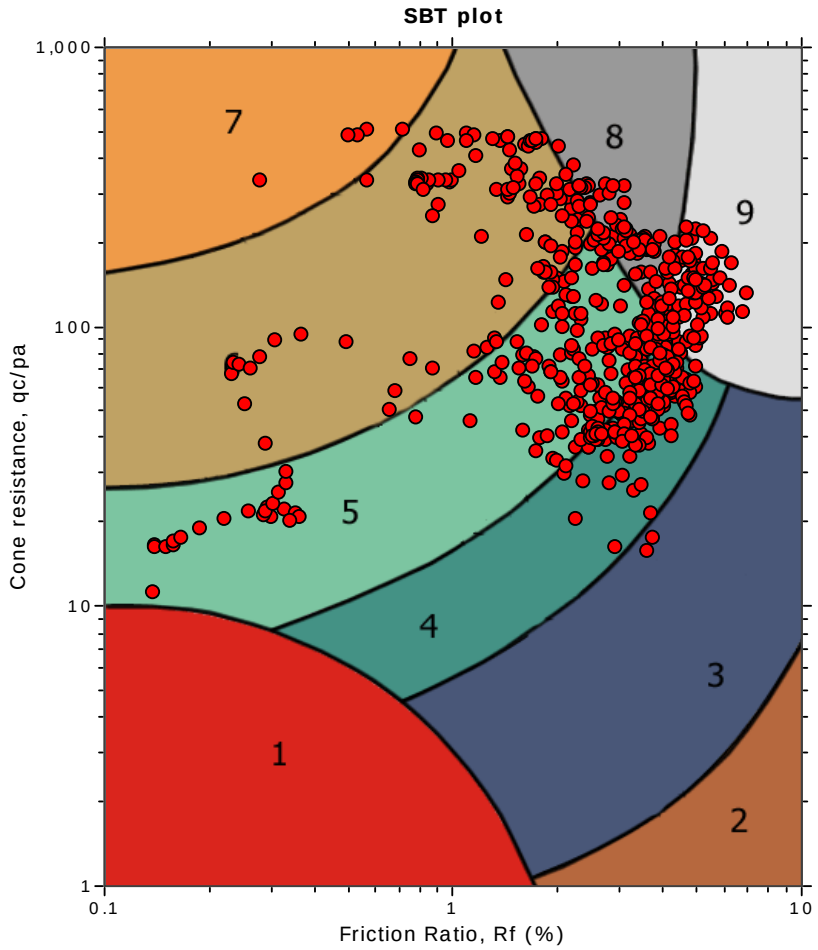
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

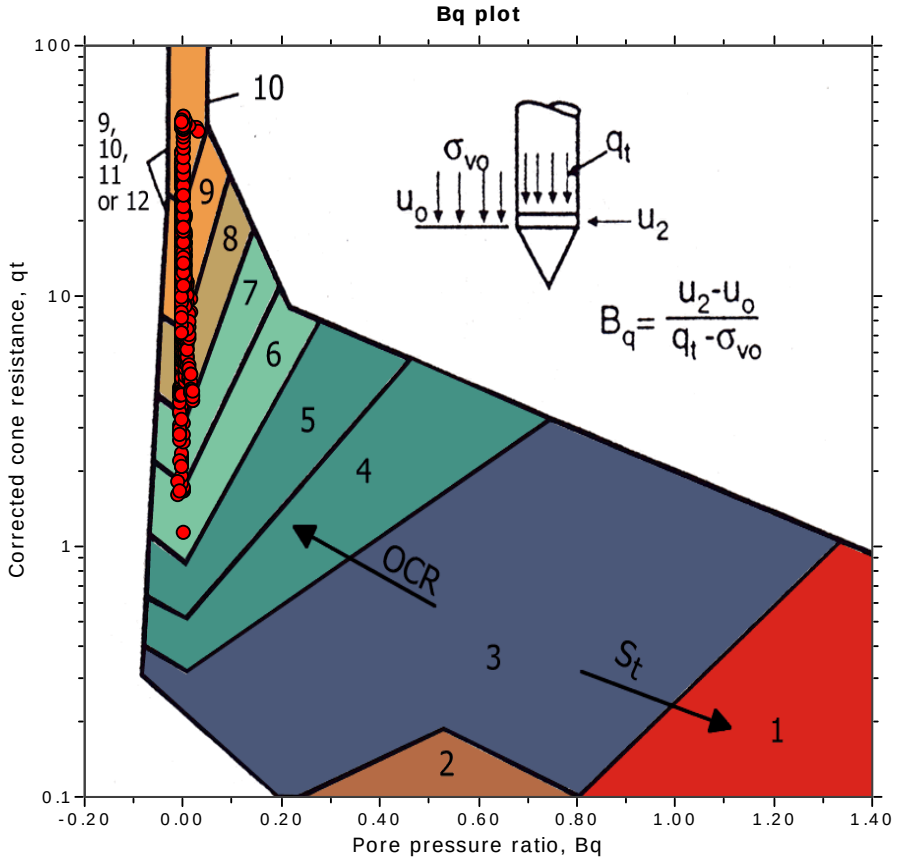
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0301CPT
Total depth: 100.56 ft
Surface Elevation: 346.58 ft
Coords: X:6178686.17, Y:2375973.47

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

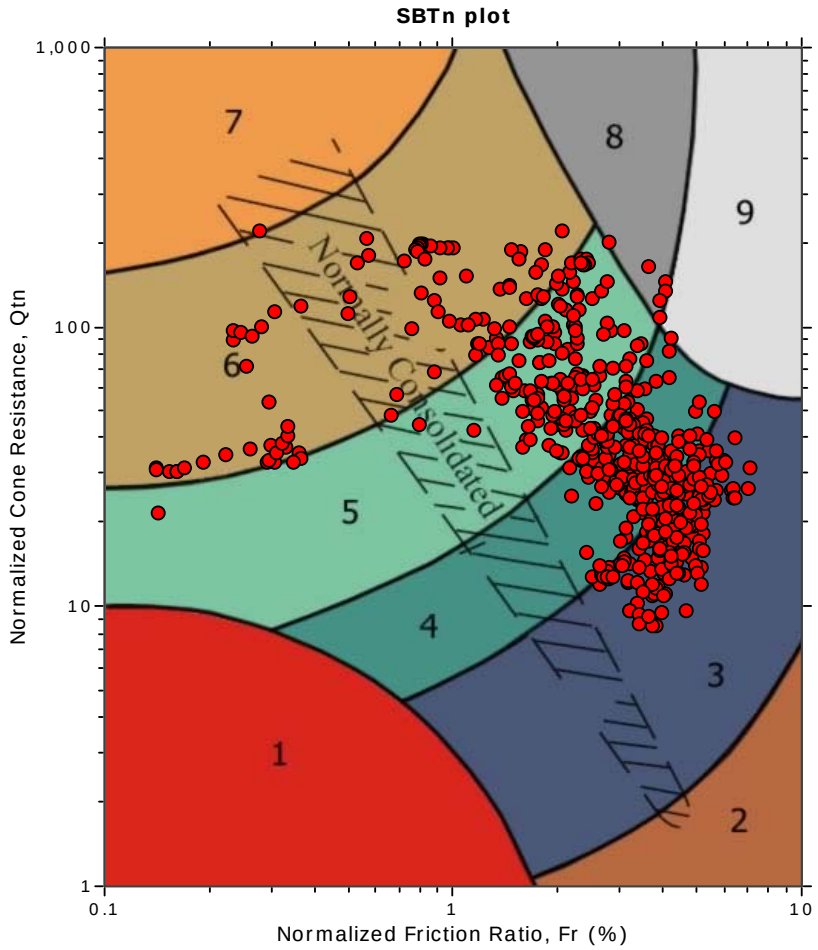
CPT: S0301CPT

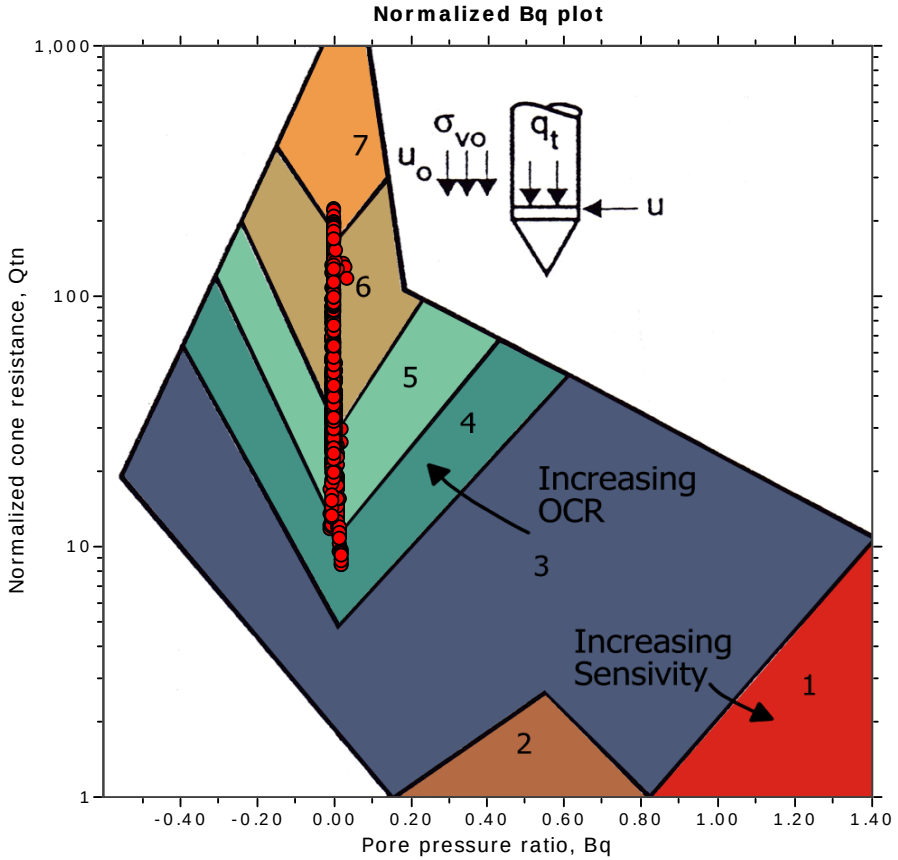
Total depth: 100.56 ft

Surface Elevation: 346.58 ft

Coords: X:6178686.17, Y:2375973.47

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0301CPT

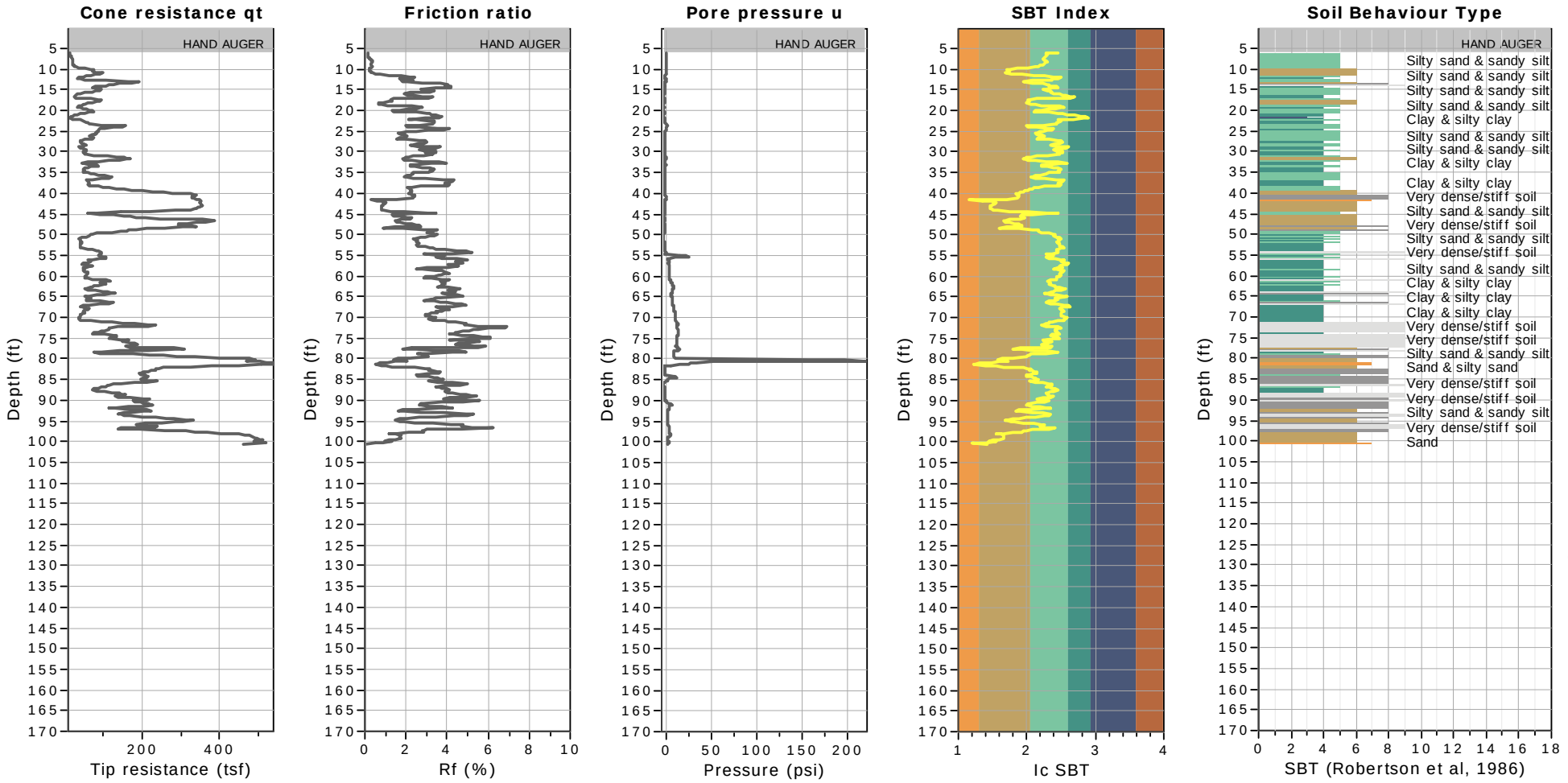
Total depth: 100.56 ft

Surface Elevation: 346.58 ft

Coords: X:6178686.17, Y:2375973.47

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0301CPT

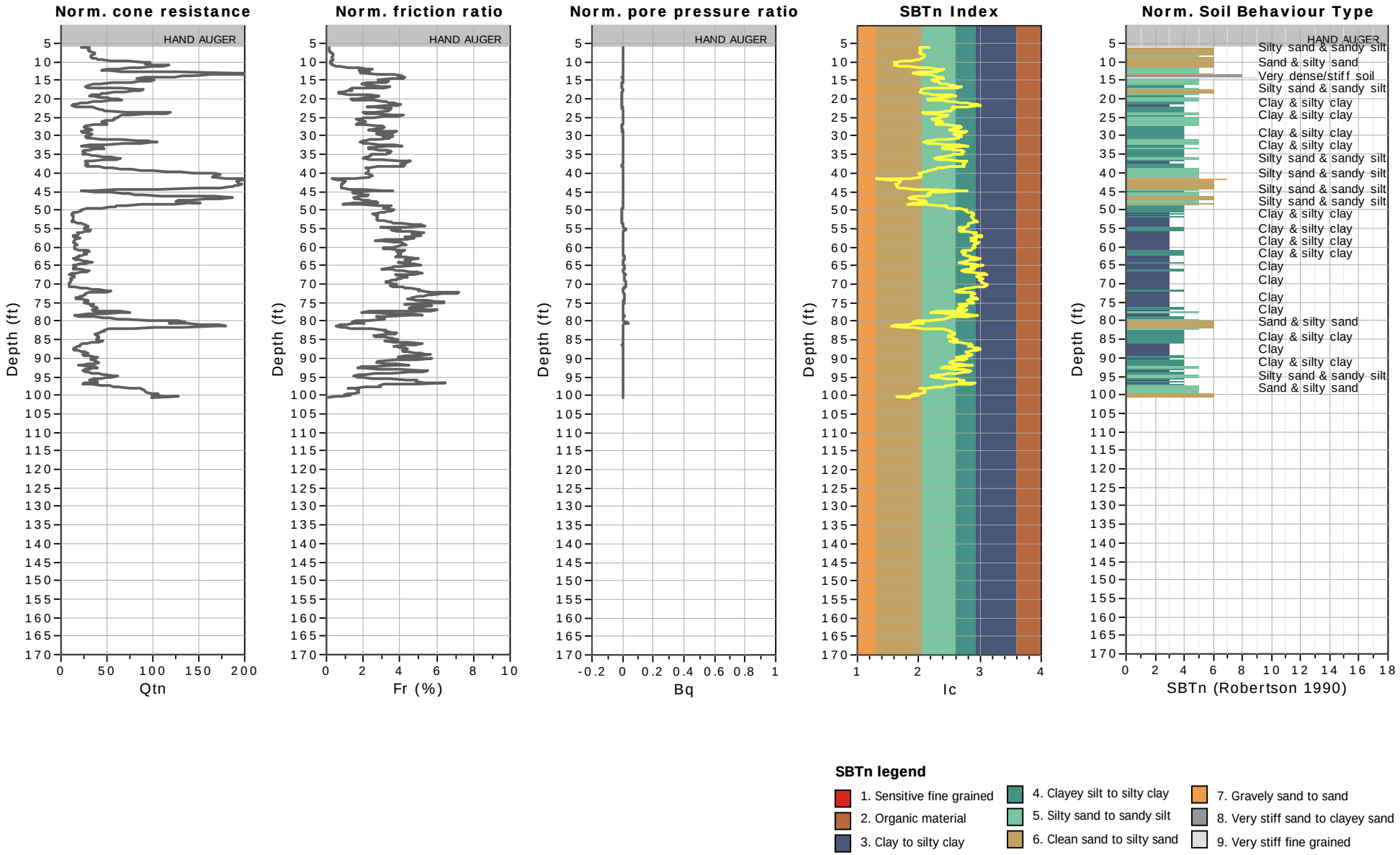
Total depth: 100.56 ft

Surface Elevation: 346.58 ft

Coords: X:6178686.17, Y:2375973.47

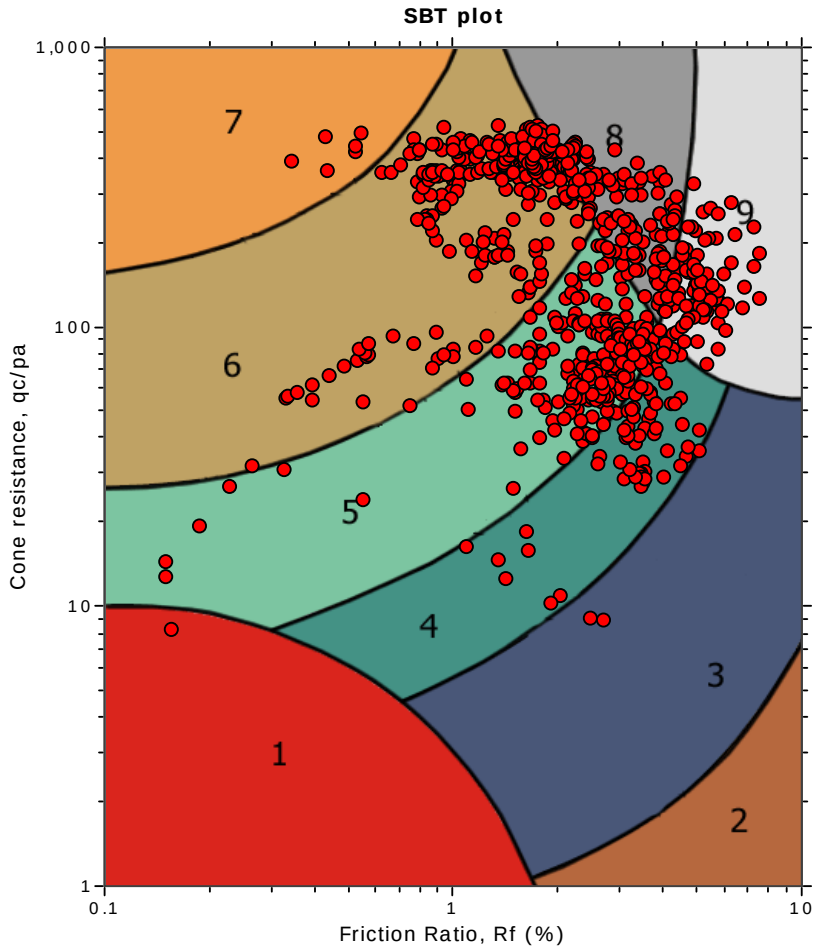
Project: California High-Speed Train

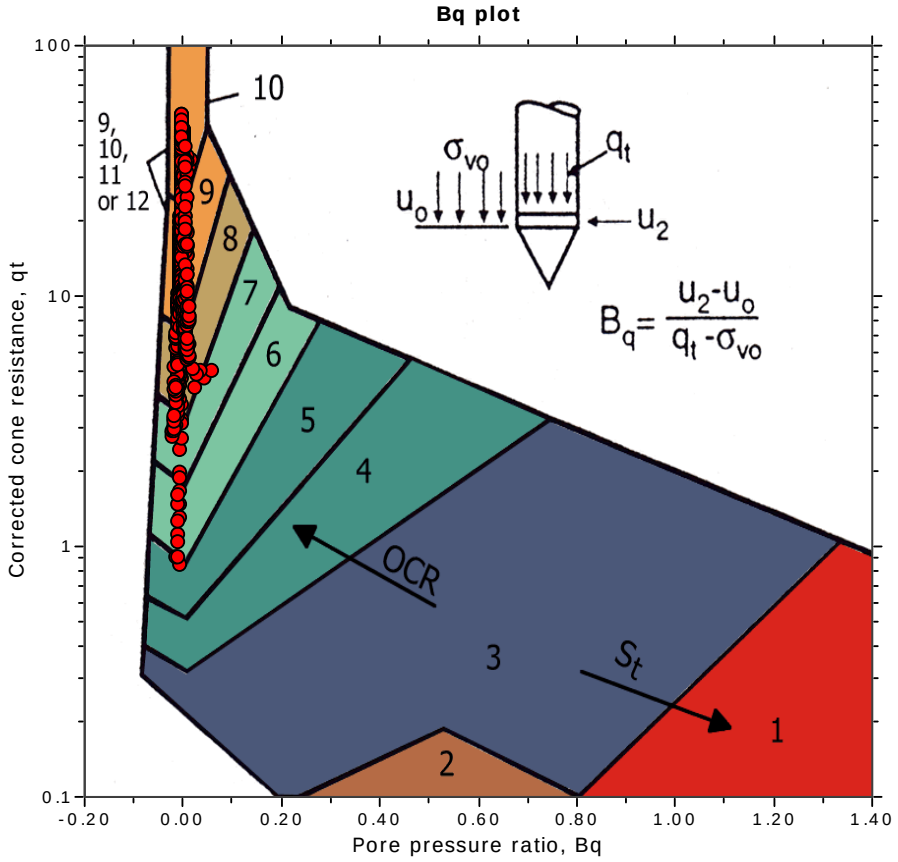
Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



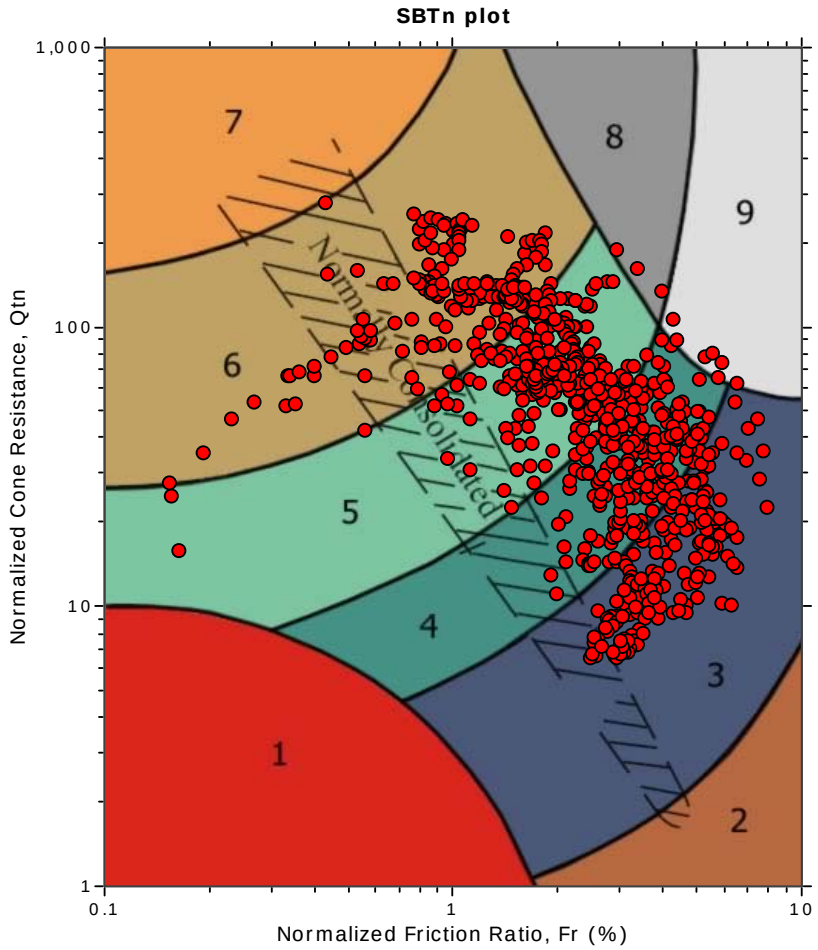


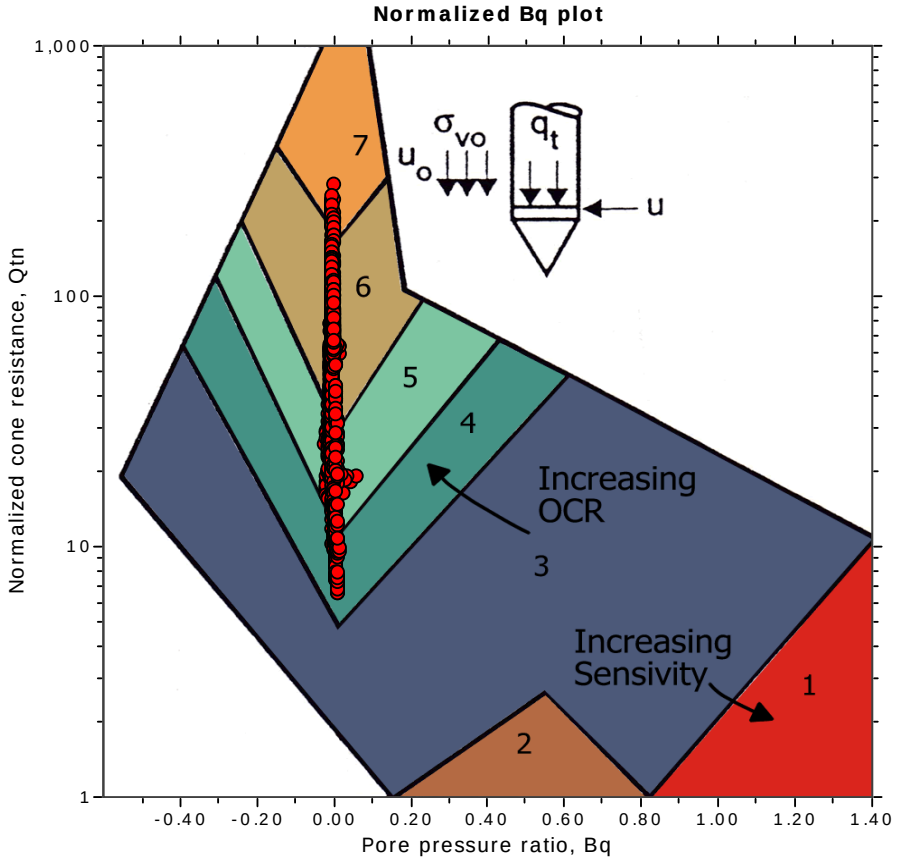
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0302CPT

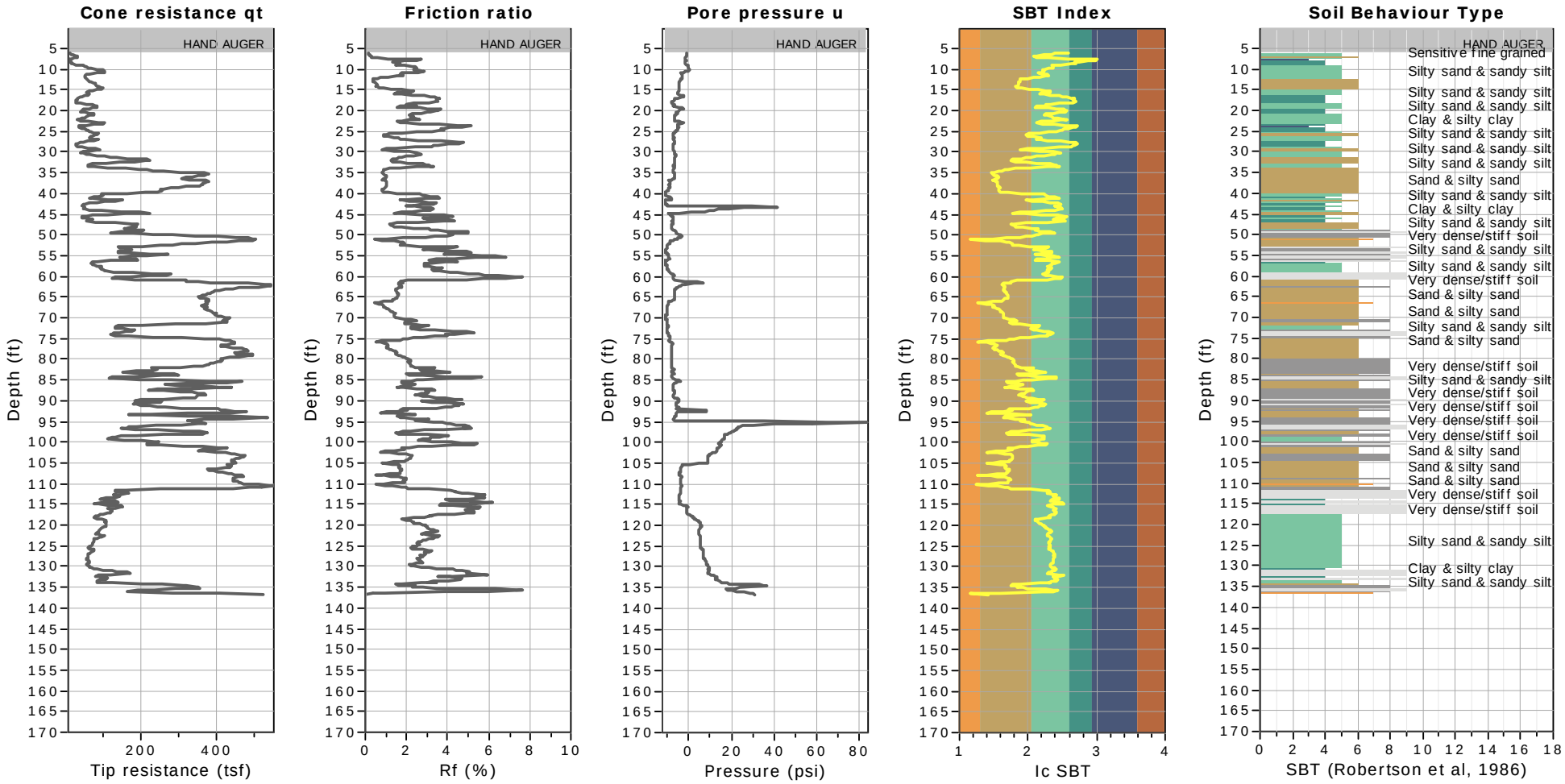
Total depth: 136.65 ft

Surface Elevation: 346.08 ft

Coords: X:6179457.50, Y:2374889.31

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

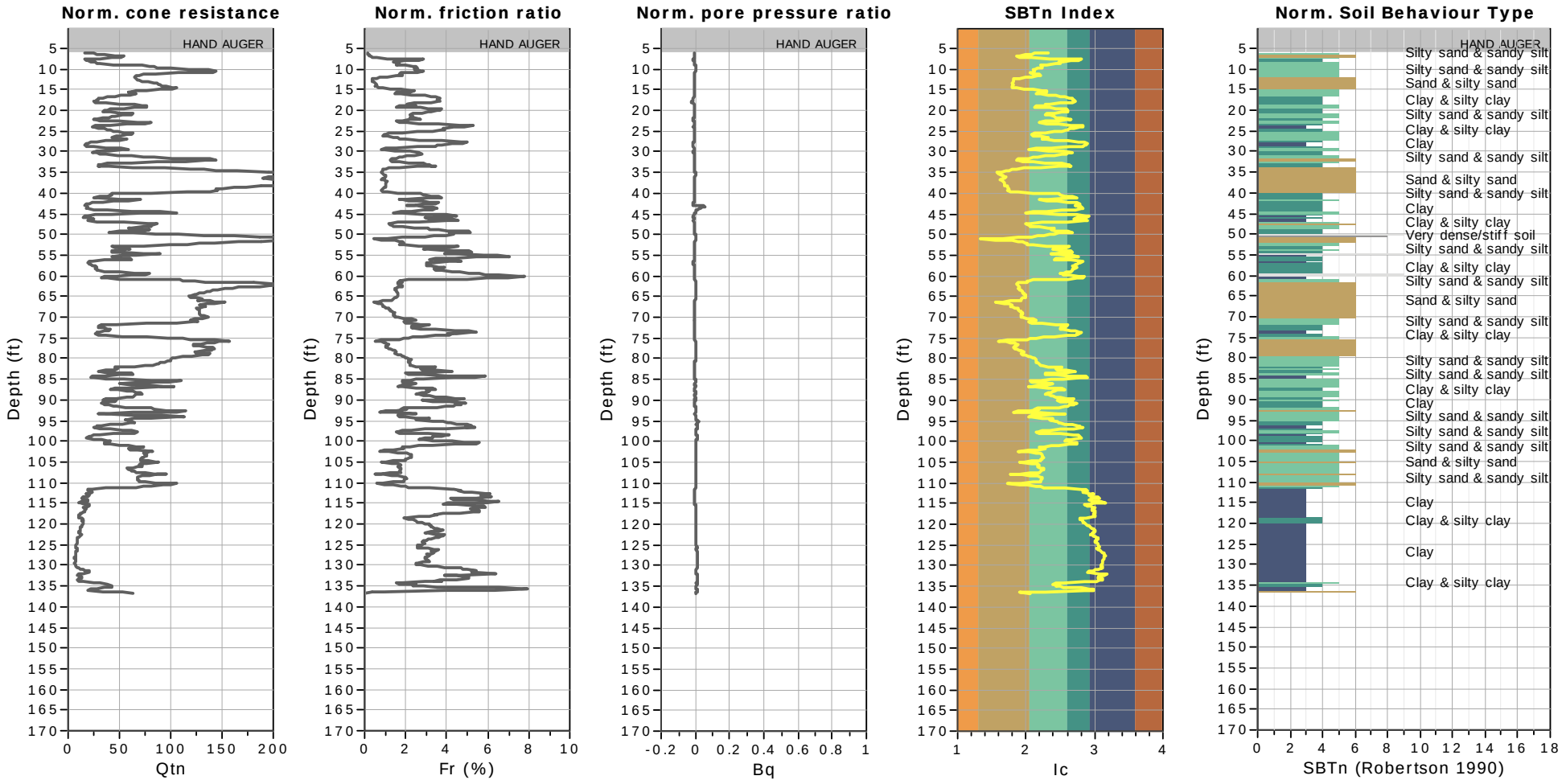
Location: Fresno-Bakersfield

CPT: S0302CPT

Total depth: 136.65 ft

Surface Elevation: 346.08 ft

Coords: X:6179457.50, Y:2374889.31



SBTn legend

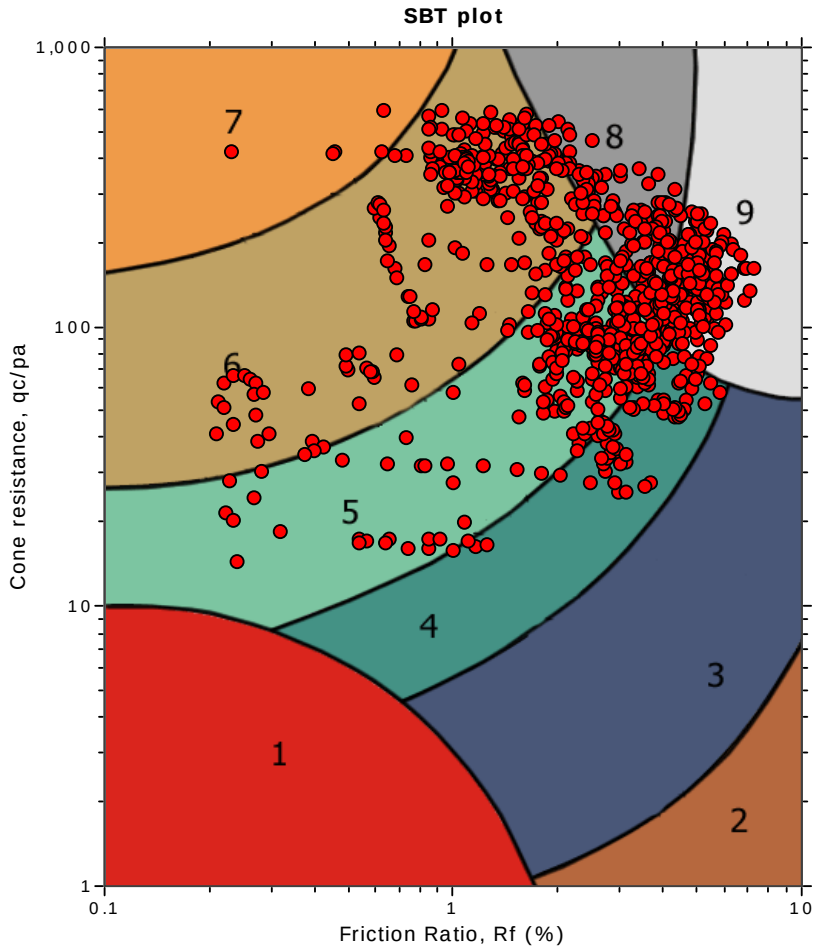
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

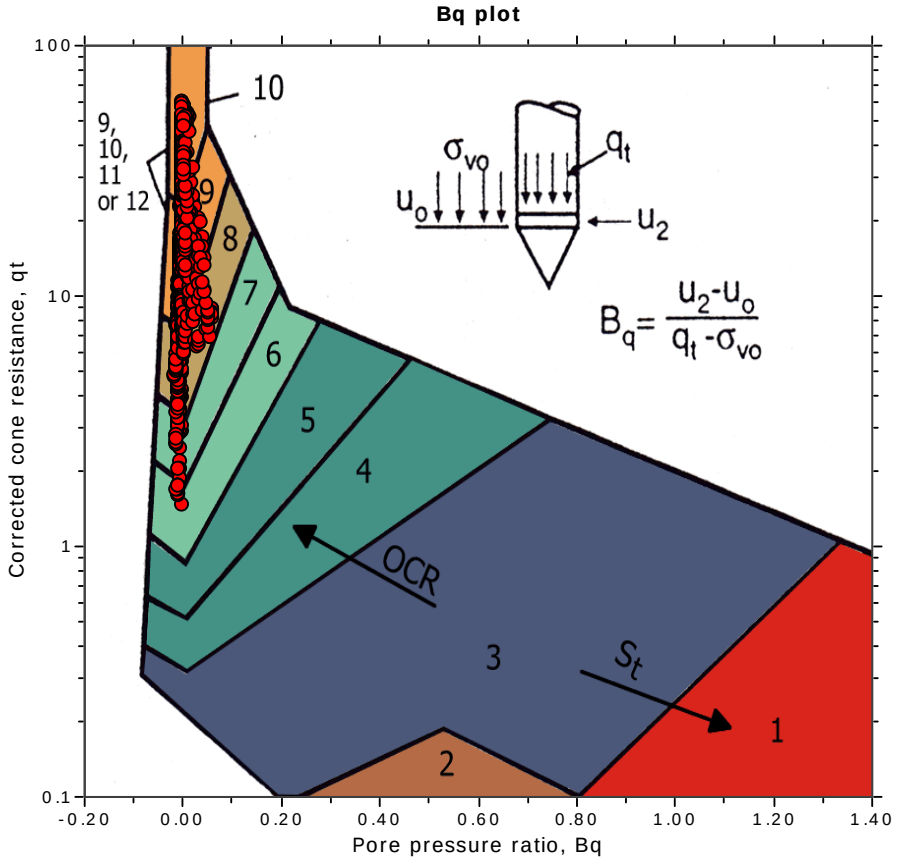
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0303CPT
Total depth: 158.46 ft
Surface Elevation: 347.56 ft
Coords: X:6180789.90, Y:2373518.45

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

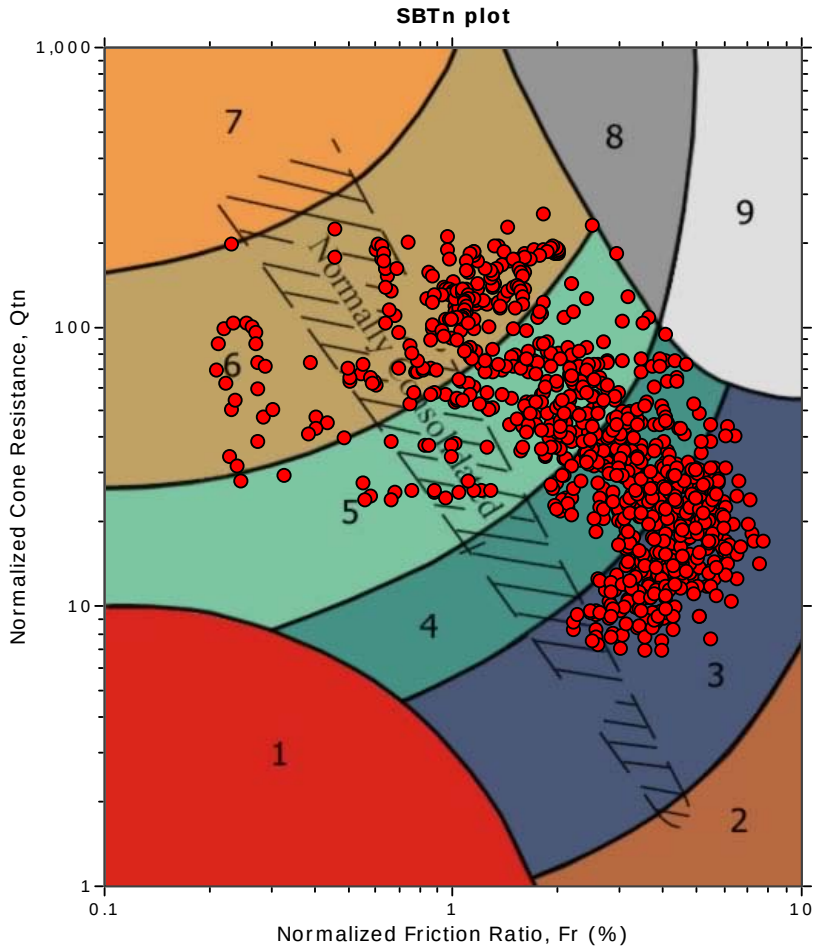
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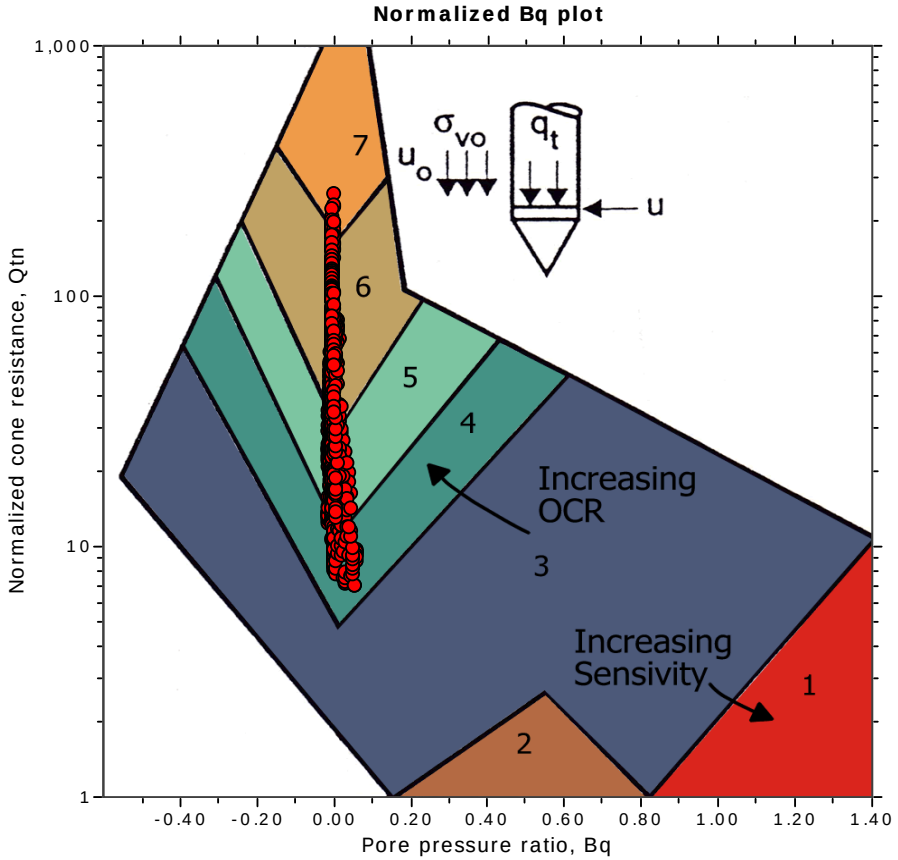
Total depth: 158.46 ft

Surface Elevation: 347.56 ft

Coords: X:6180789.90, Y:2373518.45

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0303CPT

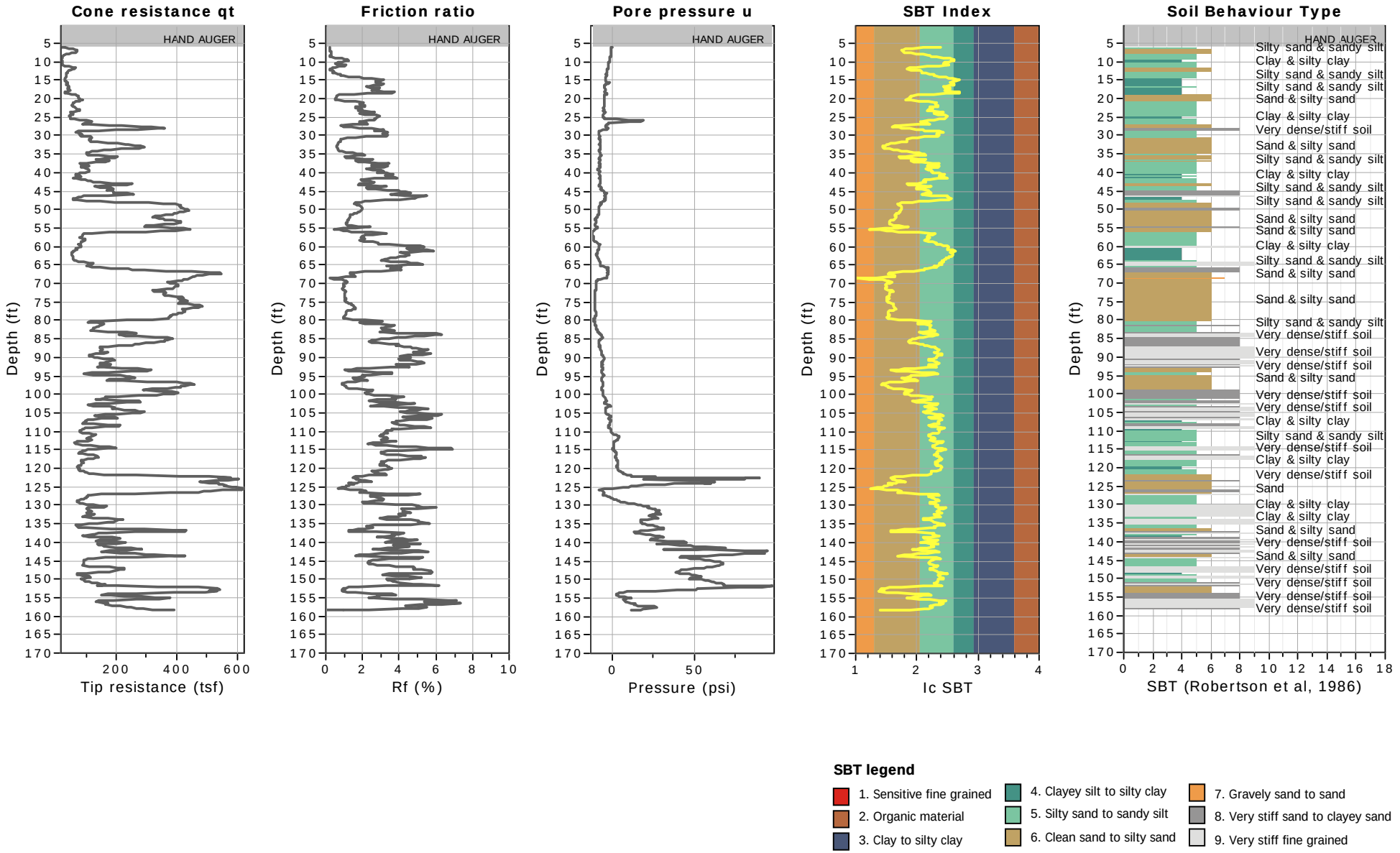
Total depth: 158.46 ft

Surface Elevation: 347.56 ft

Coords: X:6180789.90, Y:2373518.45

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0303CPT

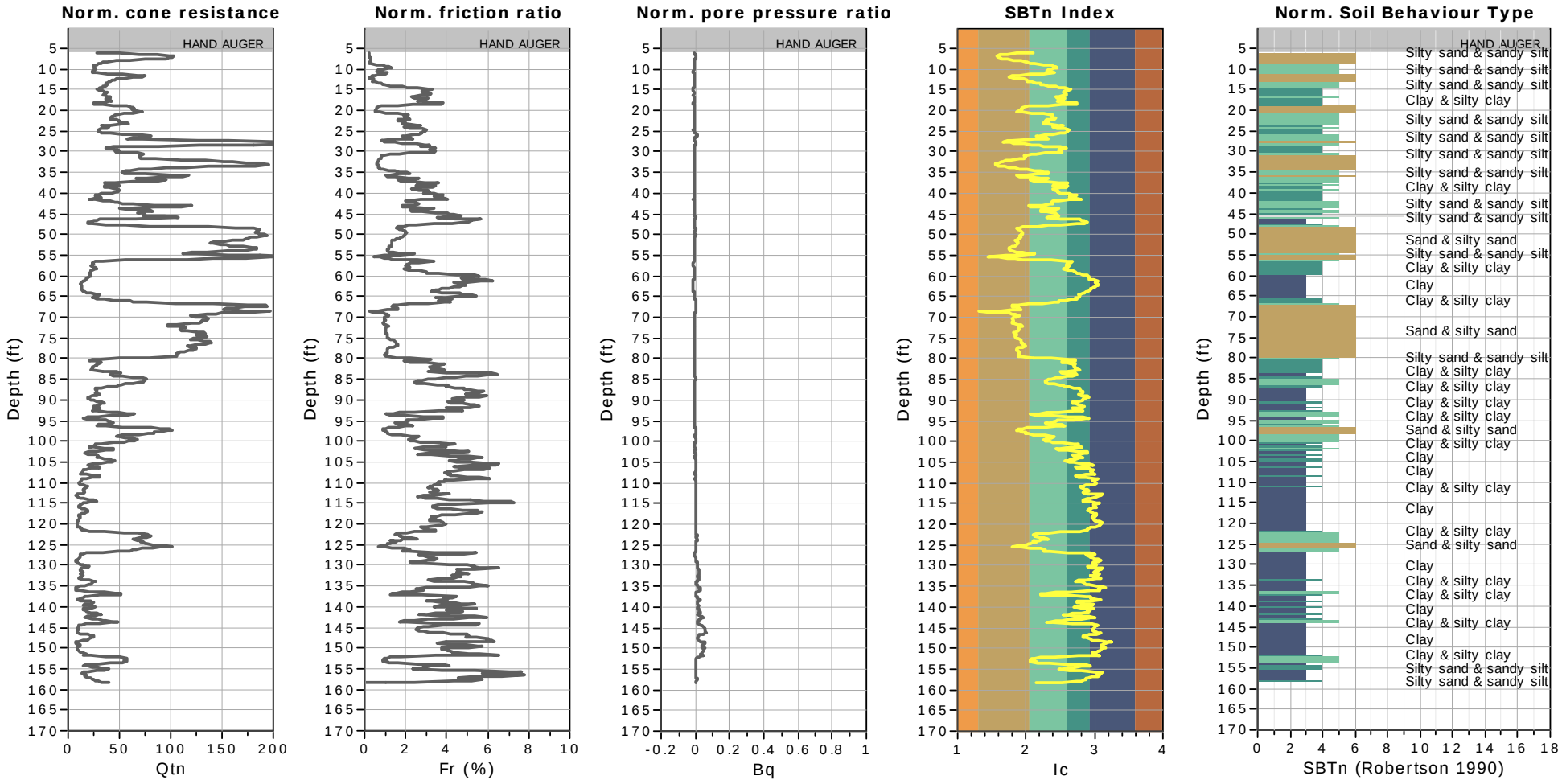
Total depth: 158.46 ft

Surface Elevation: 347.56 ft

Coords: X:6180789.90, Y:2373518.45

Project: California High-Speed Train

Location: Fresno-Bakersfield

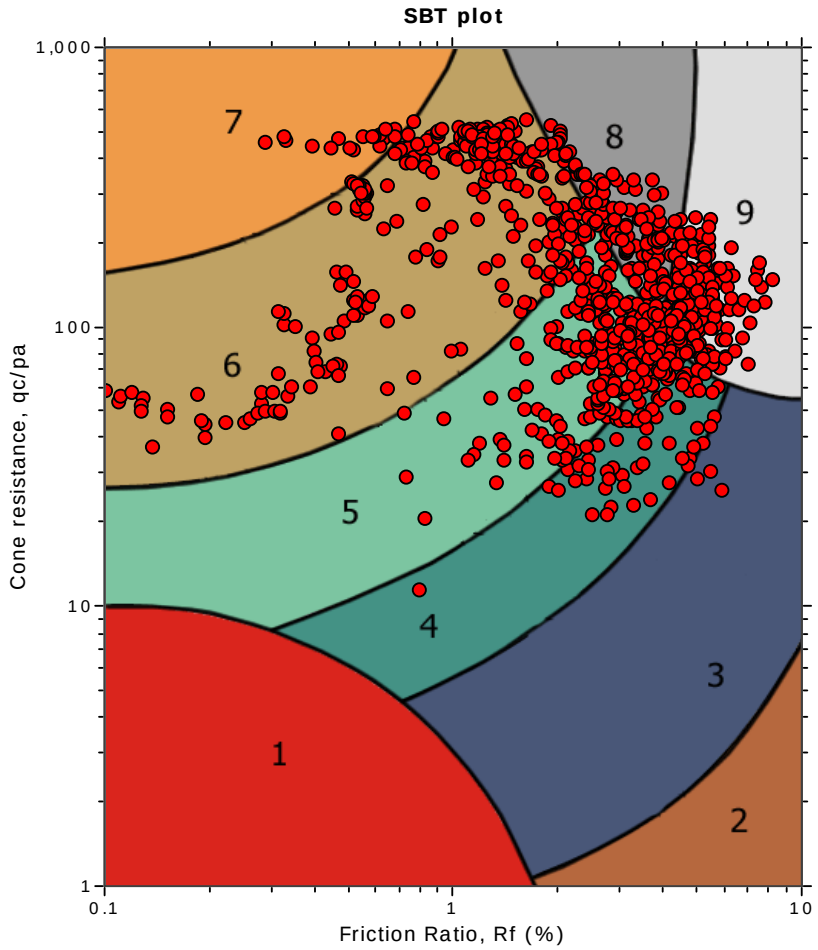


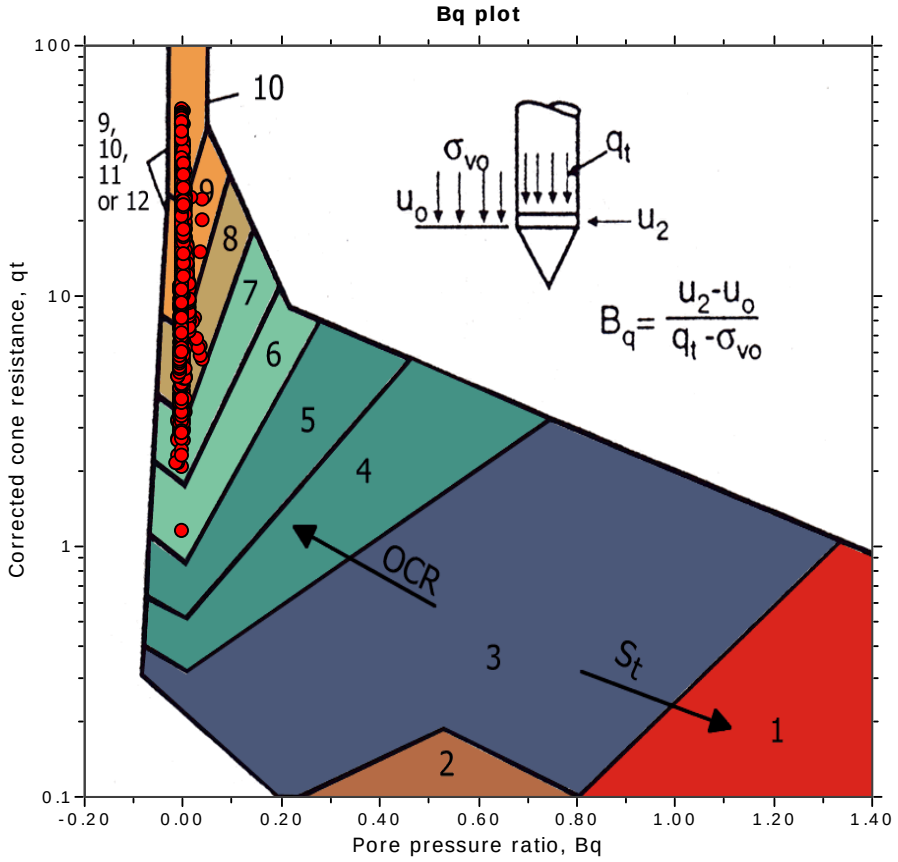
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0304CPT
Total depth: 163.39 ft
Surface Elevation: 345.43 ft
Coords: X:6182588.80, Y:2371976.10

SBT - Bq plots



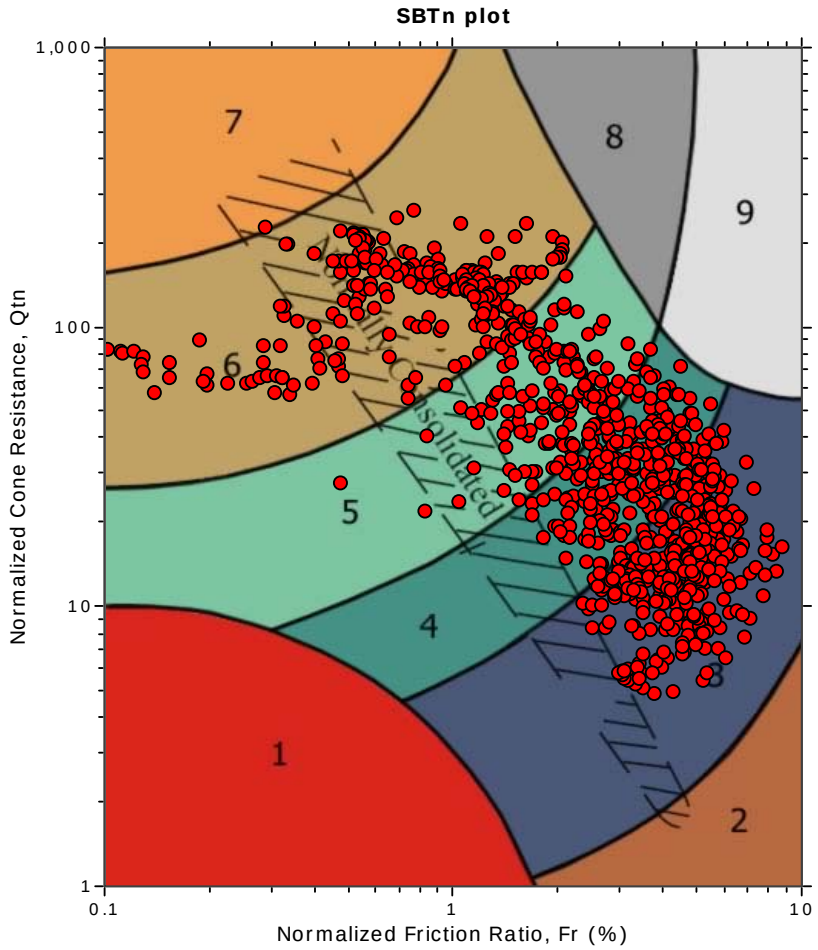


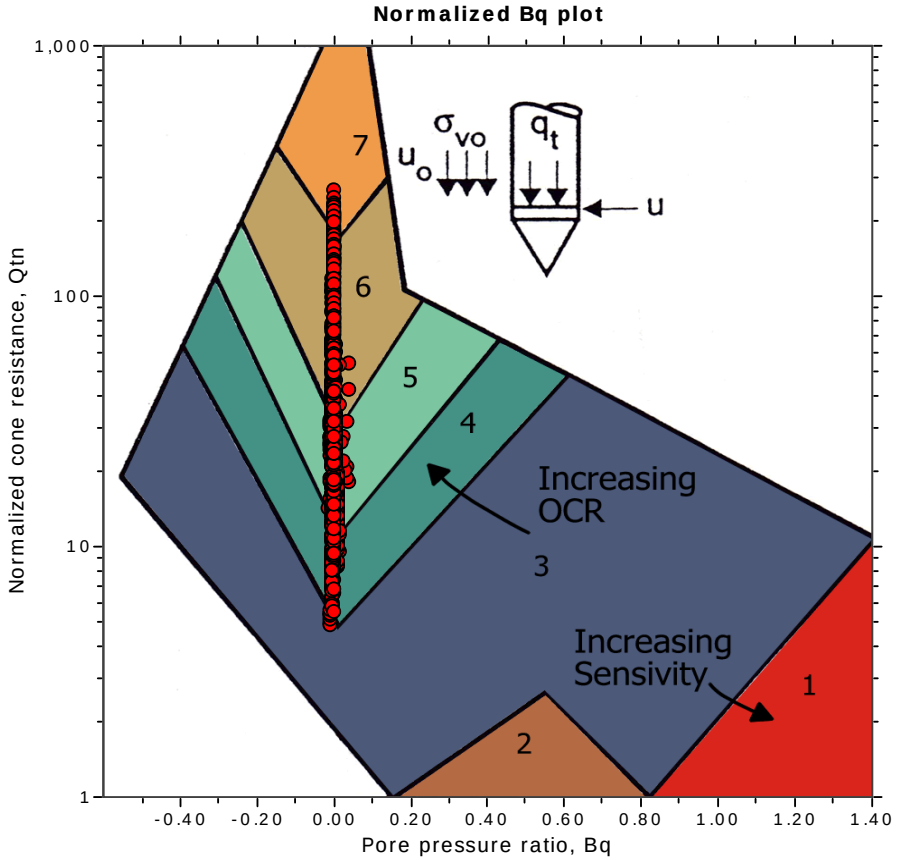
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

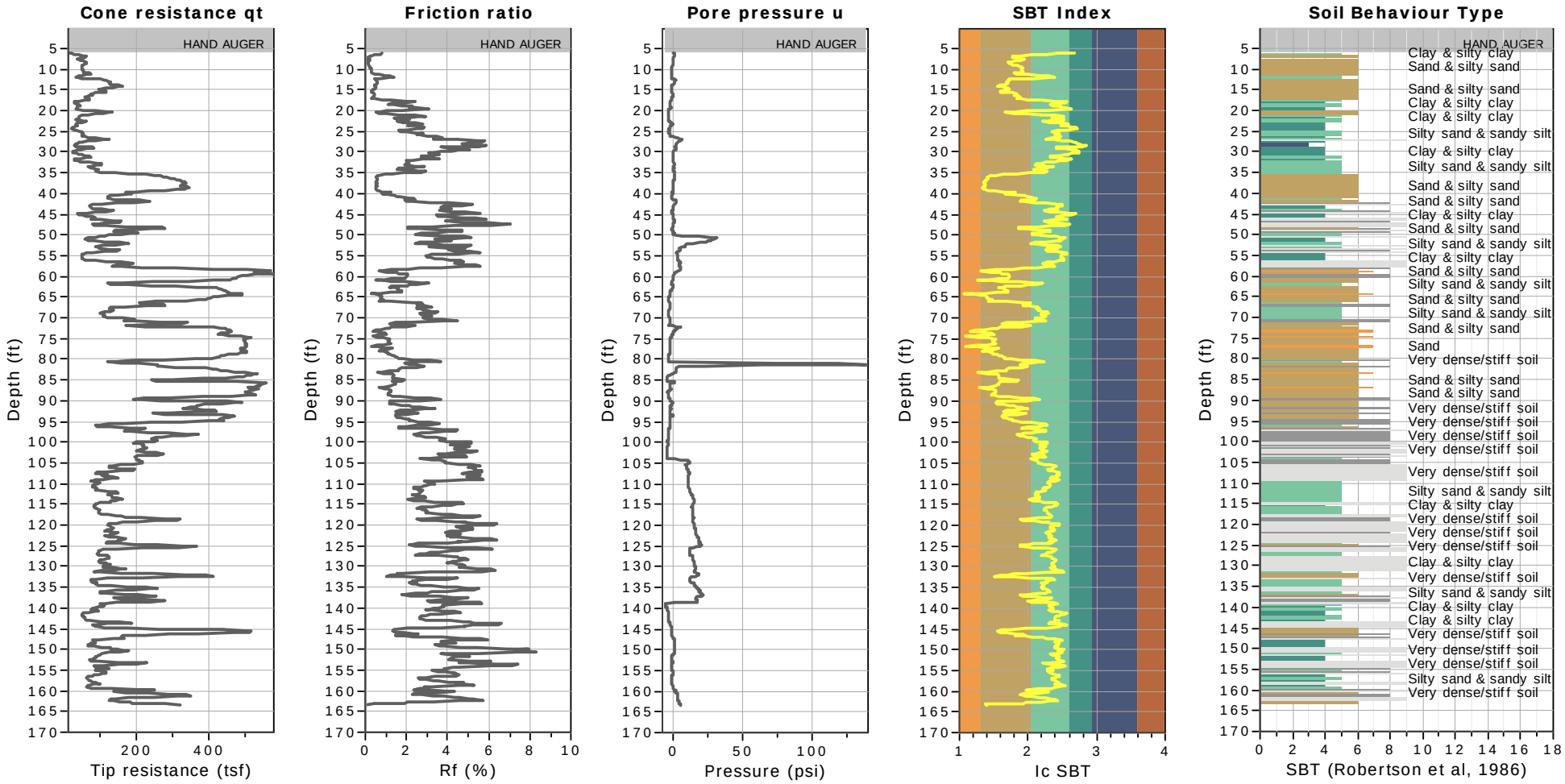
Location: Fresno-Bakersfield

CPT: S0304CPT

Total depth: 163.39 ft

Surface Elevation: 345.43 ft

Coords: X:6182588.80, Y:2371976.10



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0304CPT

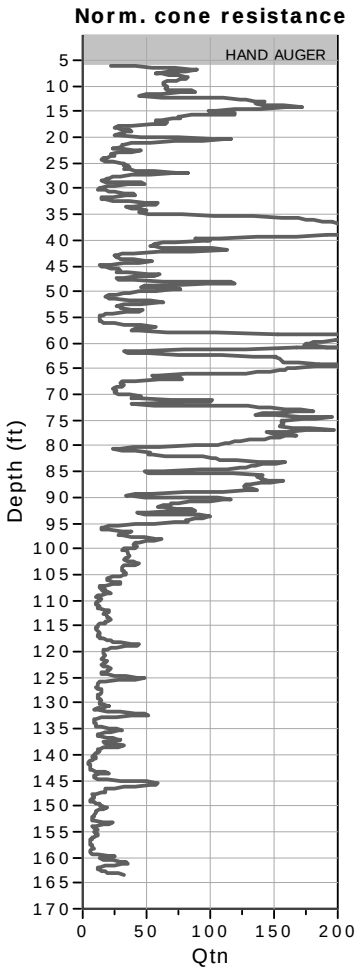
Total depth: 163.39 ft

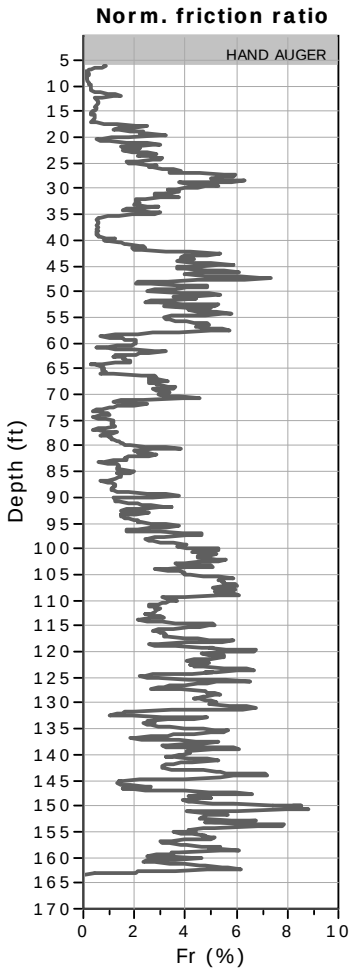
Surface Elevation: 345.43 ft

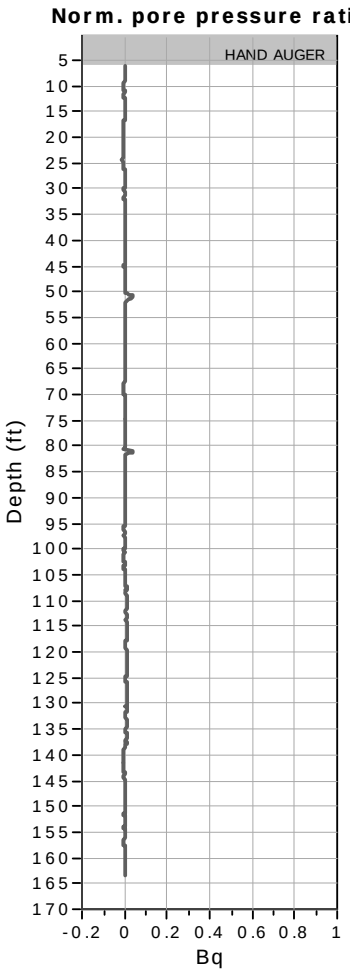
Coords: X:6182588.80, Y:2371976.10

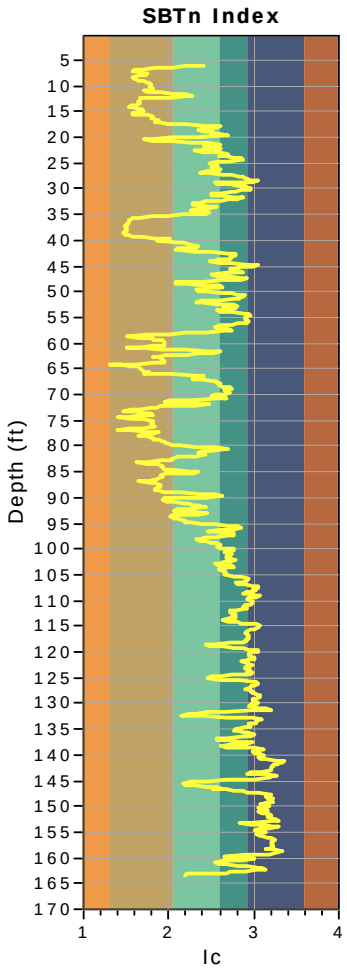
Project: California High-Speed Train

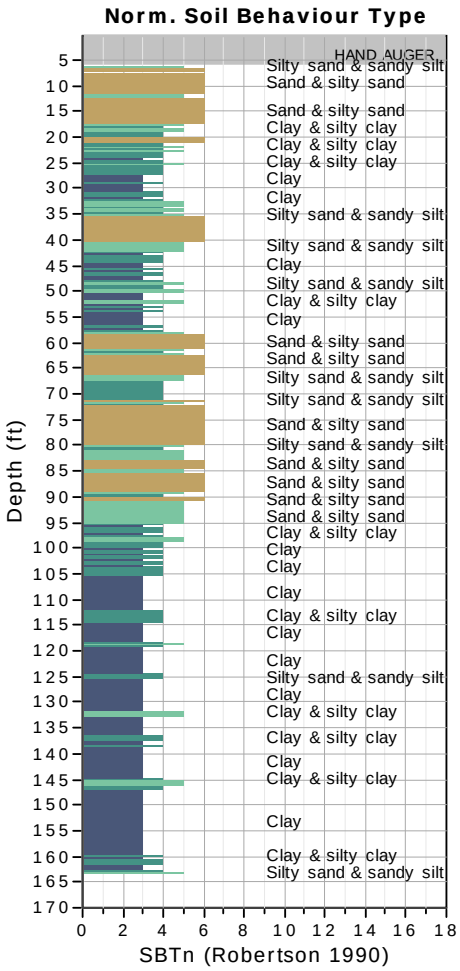
Location: Fresno-Bakersfield











SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

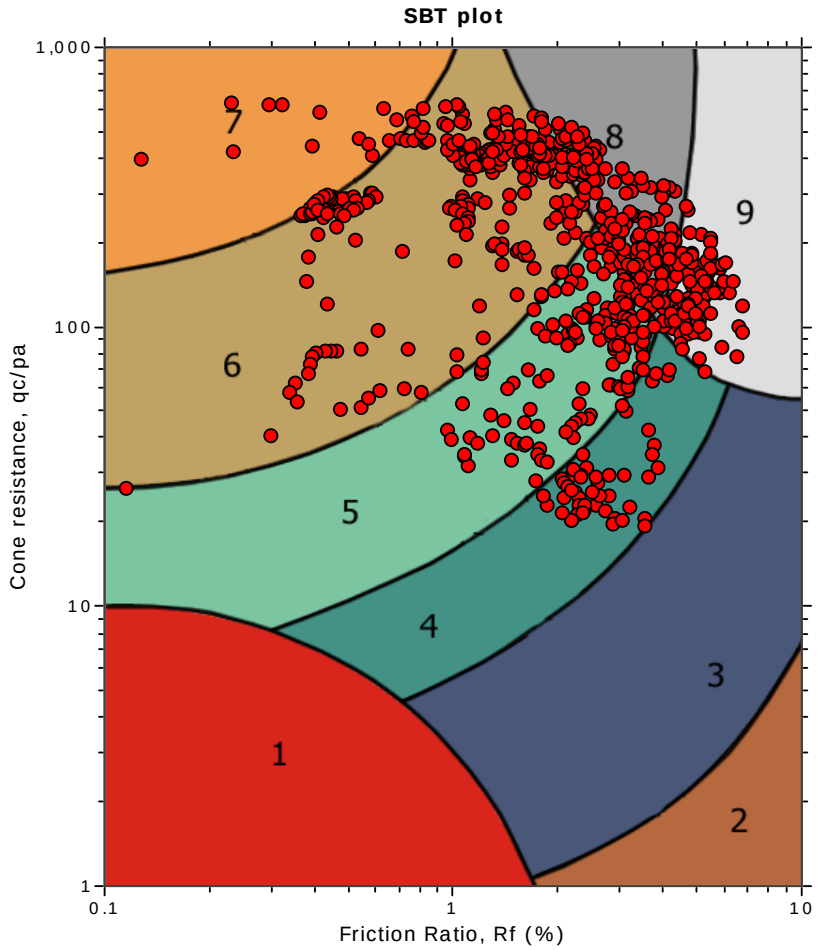
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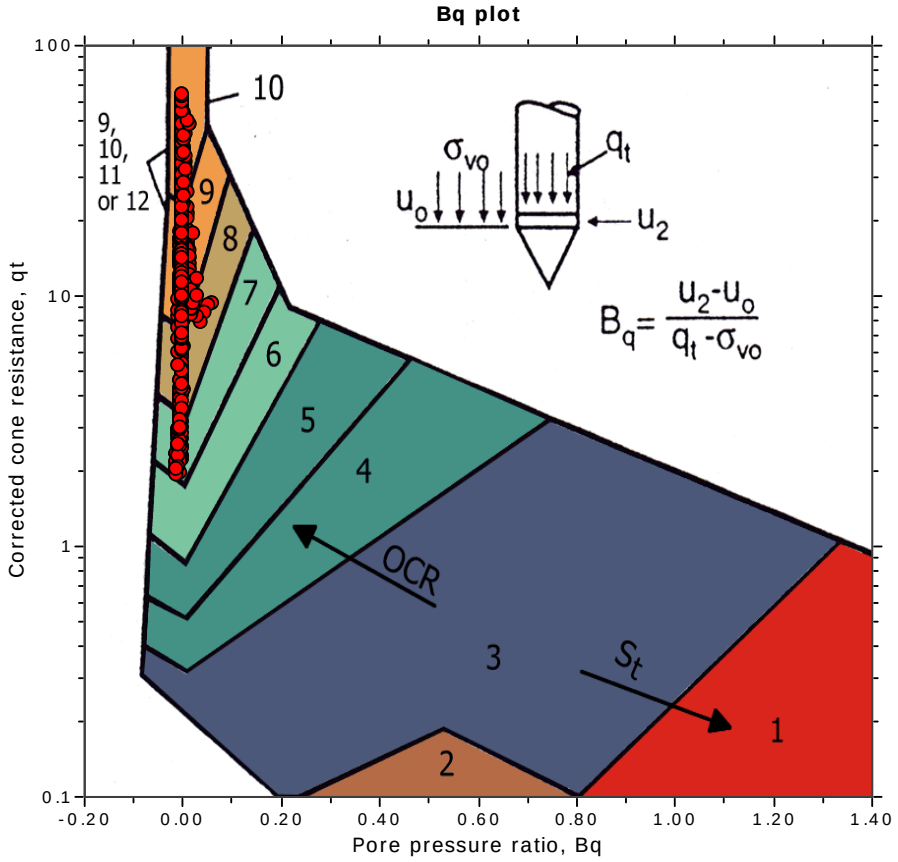
Total depth: 130.25 ft

Surface Elevation: 343.65 ft

Coords: X:6184542.67, Y:2369557.84

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

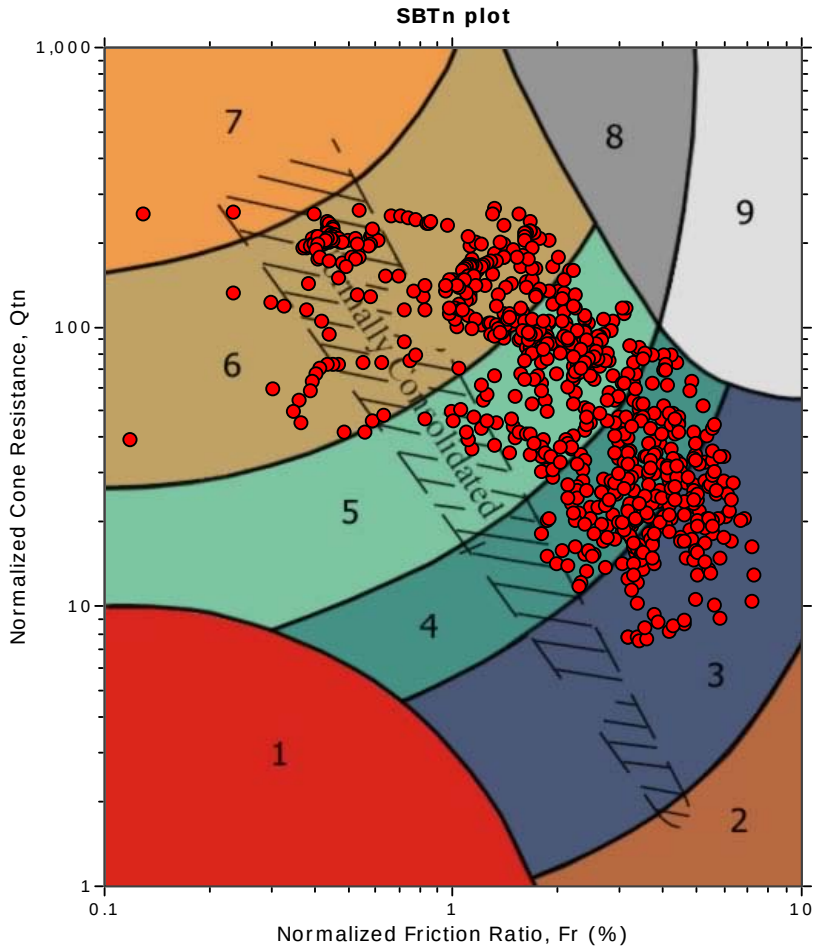
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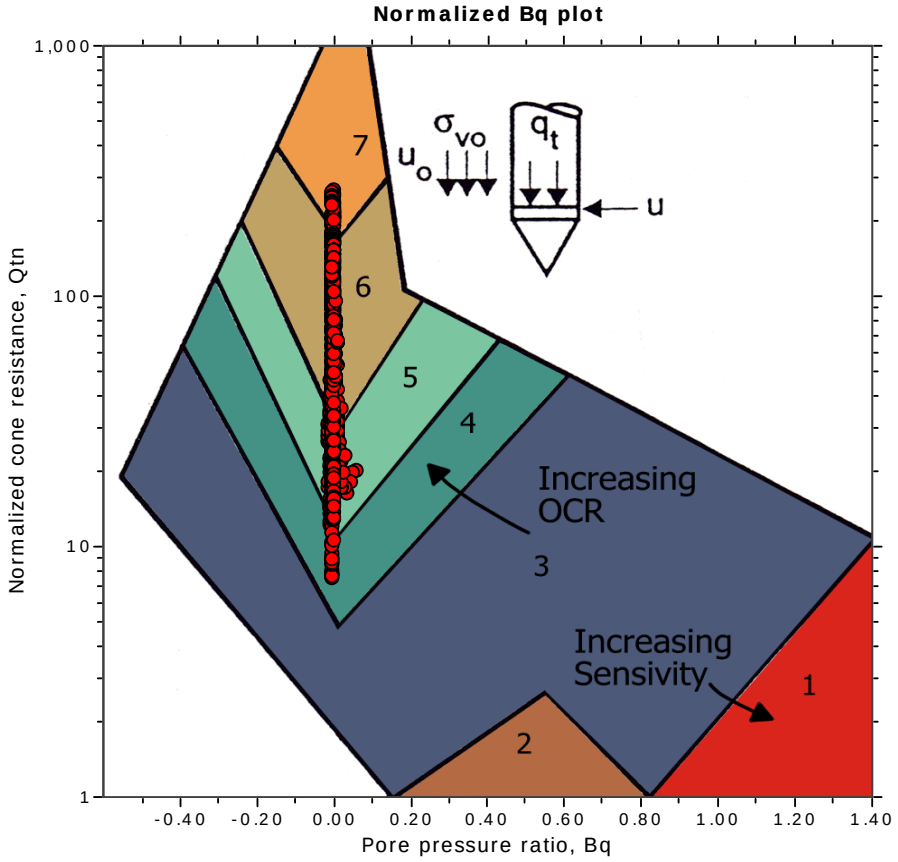
Total depth: 130.25 ft

Surface Elevation: 343.65 ft

Coords: X:6184542.67, Y:2369557.84

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0308CPT

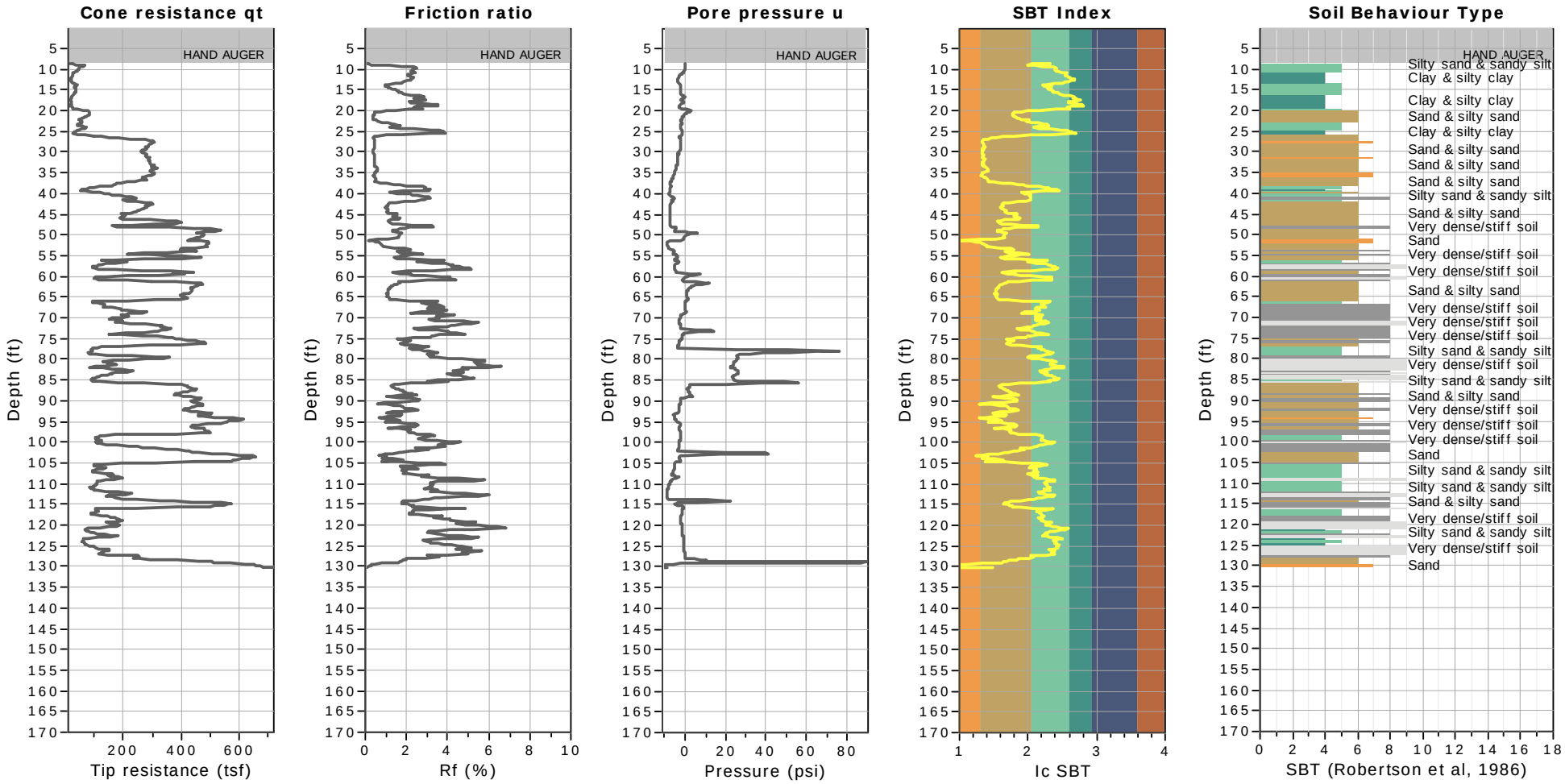
Total depth: 130.25 ft

Surface Elevation: 343.65 ft

Coords: X:6184542.67, Y:2369557.84

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

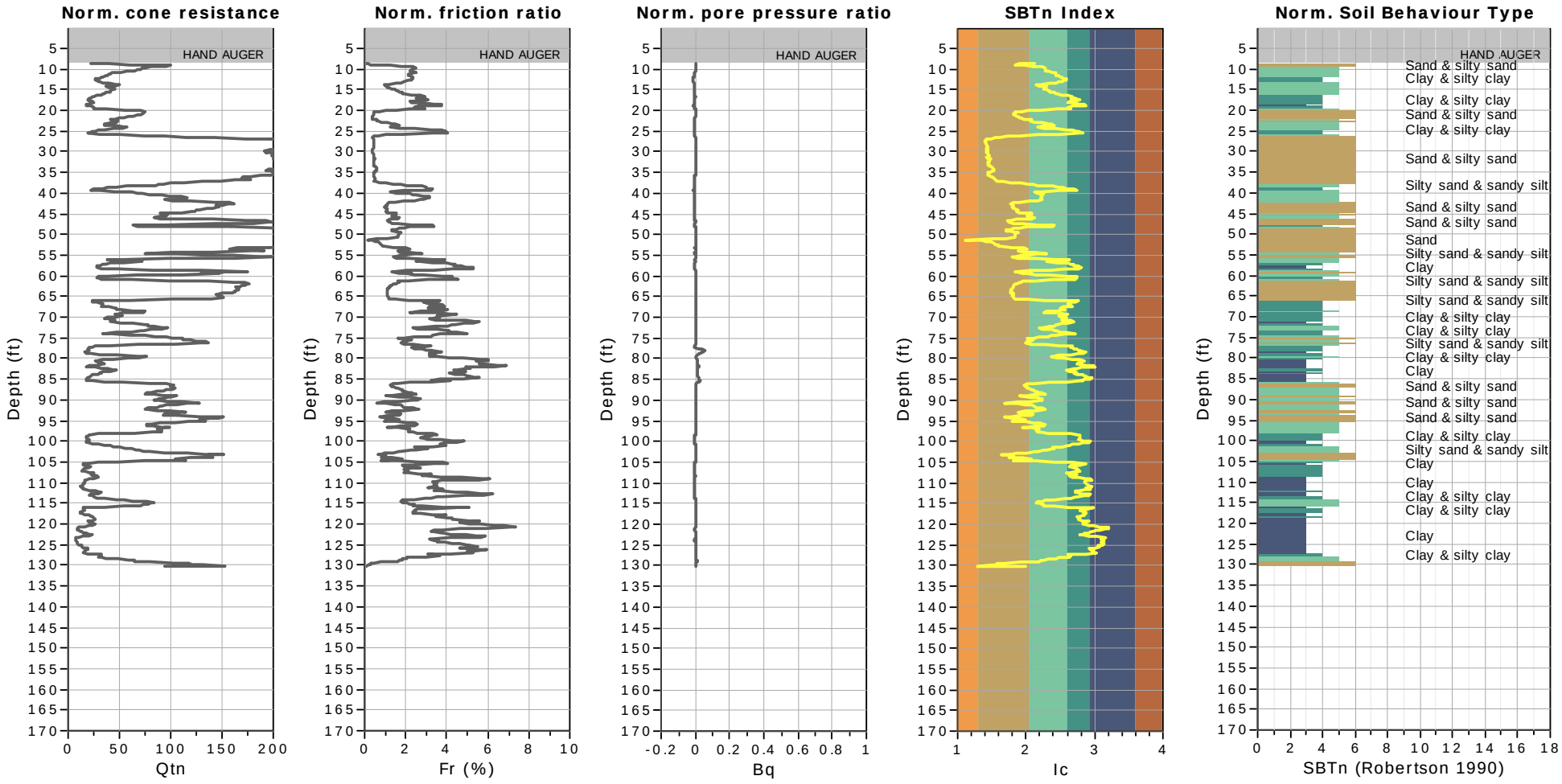
Location: Fresno-Bakersfield

CPT: S0308CPT

Total depth: 130.25 ft

Surface Elevation: 343.65 ft

Coords: X:6184542.67, Y:2369557.84



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

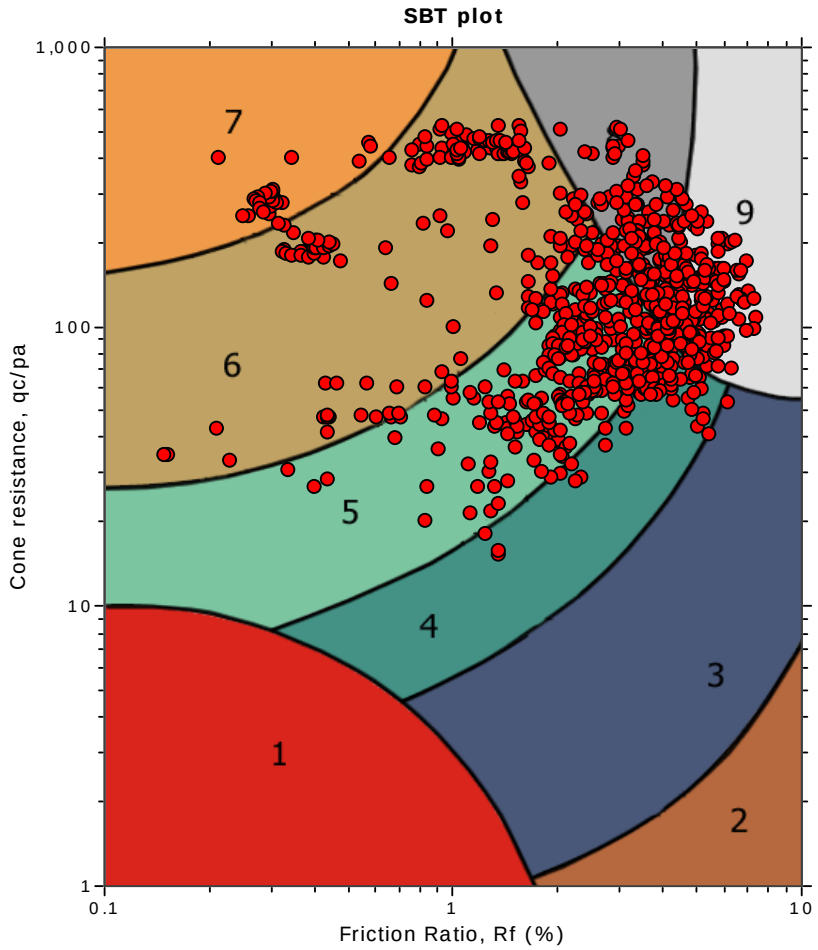
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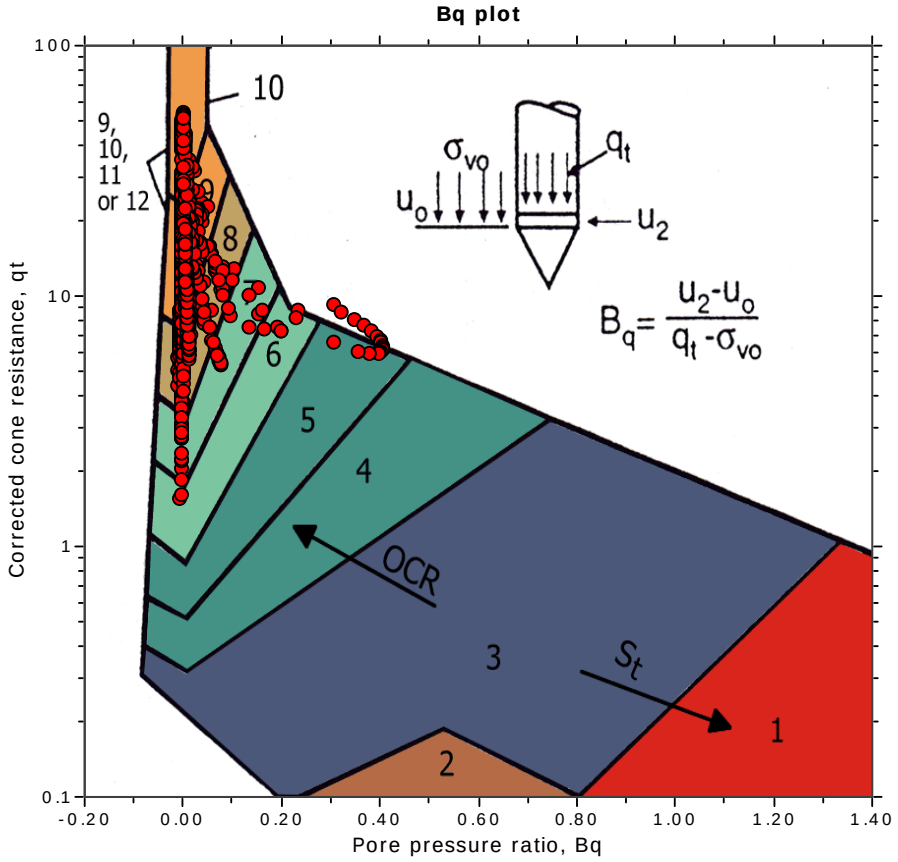
Total depth: 144.03 ft

Surface Elevation: 346.14 ft

Coords: X:6186374.54, Y:2368141.64

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

Location: Fresno-Bakersfield

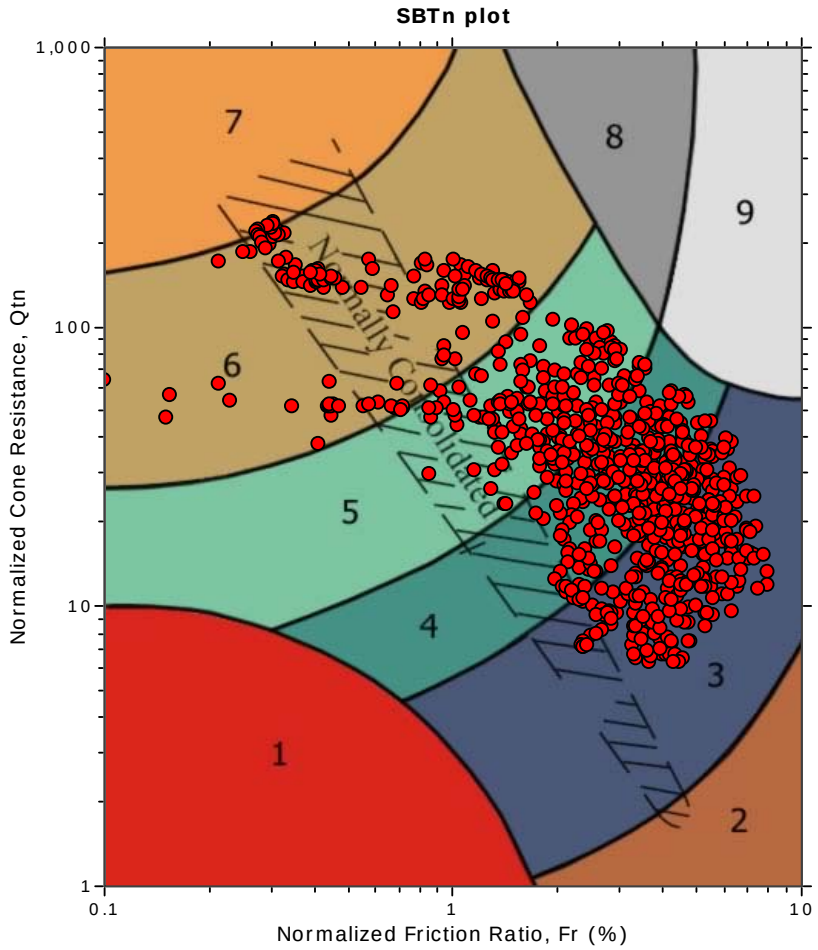
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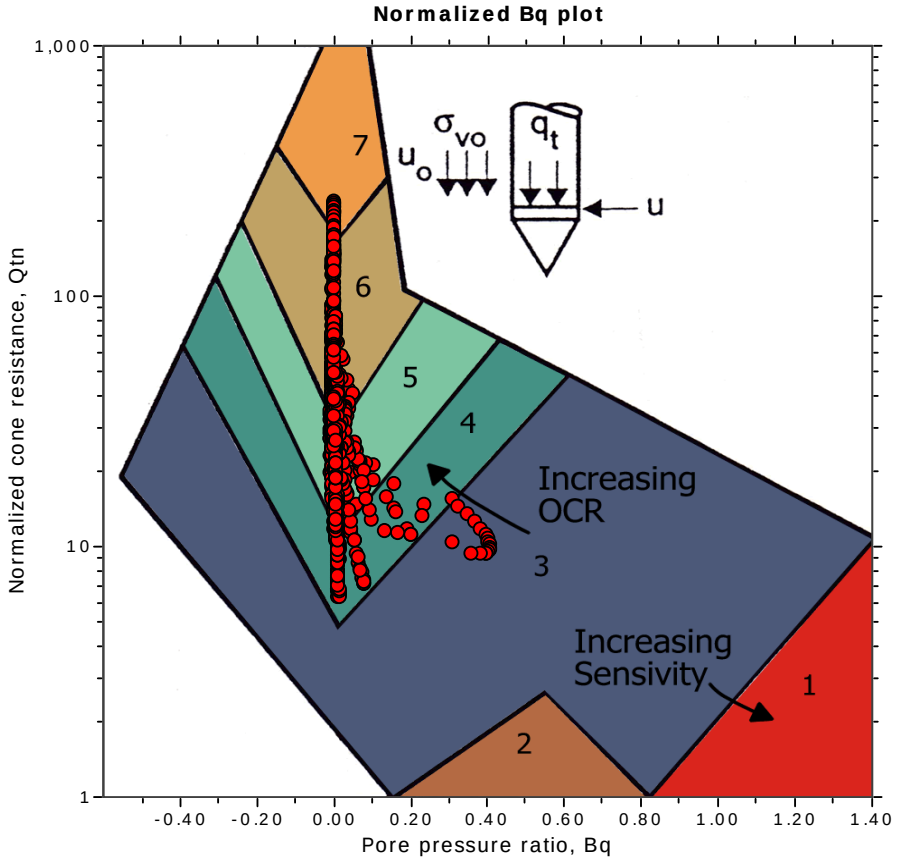
Total depth: 144.03 ft

Surface Elevation: 346.14 ft

Coords: X:6186374.54, Y:2368141.64

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

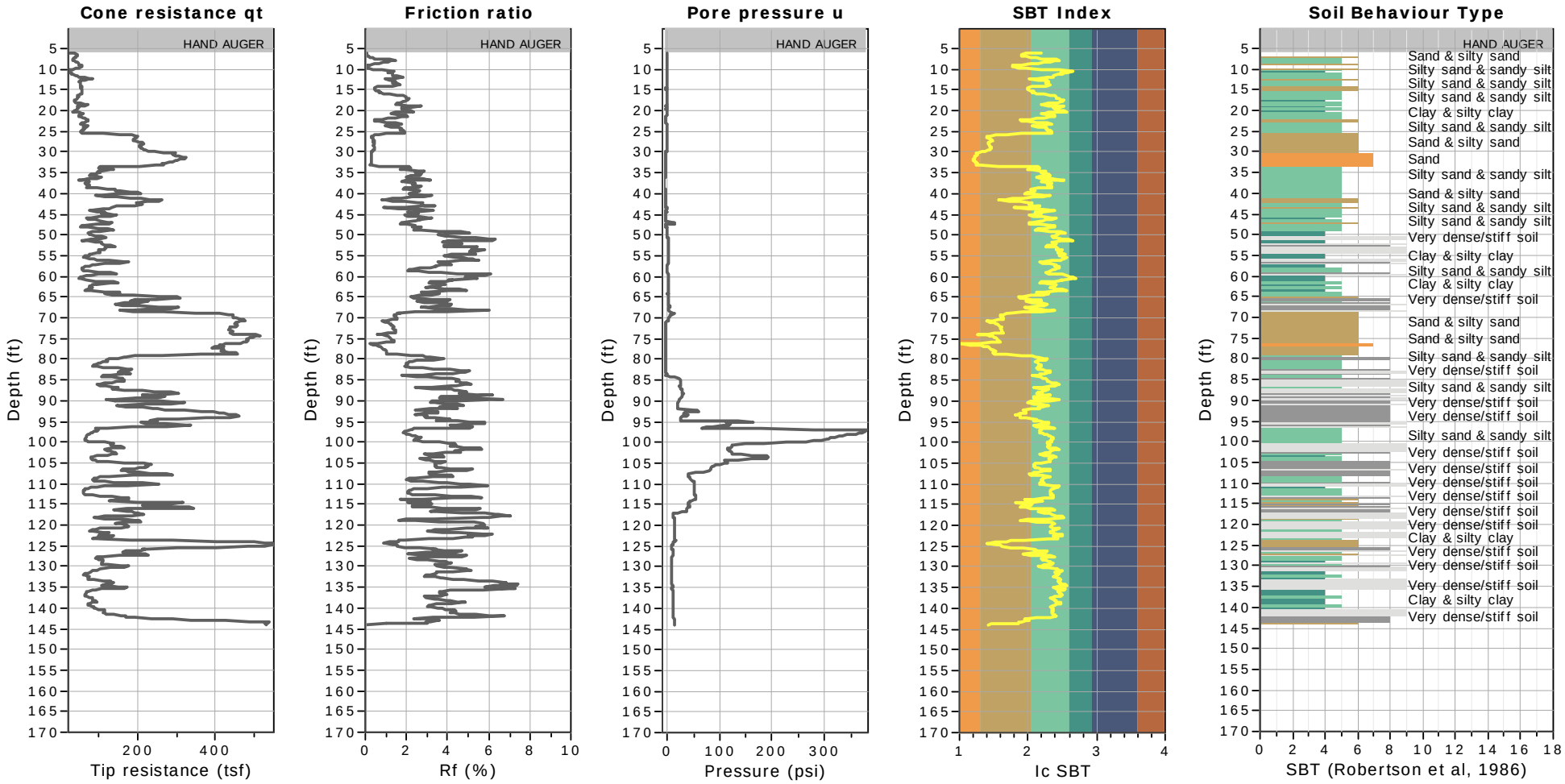
Location: Fresno-Bakersfield

CPT: S0309CPT

Total depth: 144.03 ft

Surface Elevation: 346.14 ft

Coords: X:6186374.54, Y:2368141.64



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0309CPT

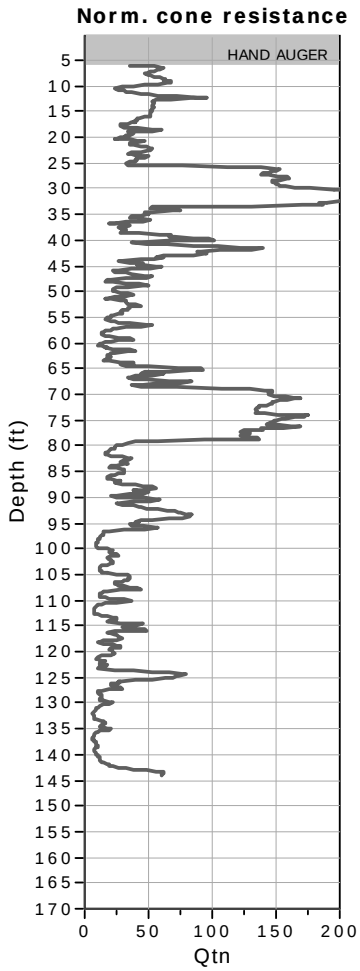
Total depth: 144.03 ft

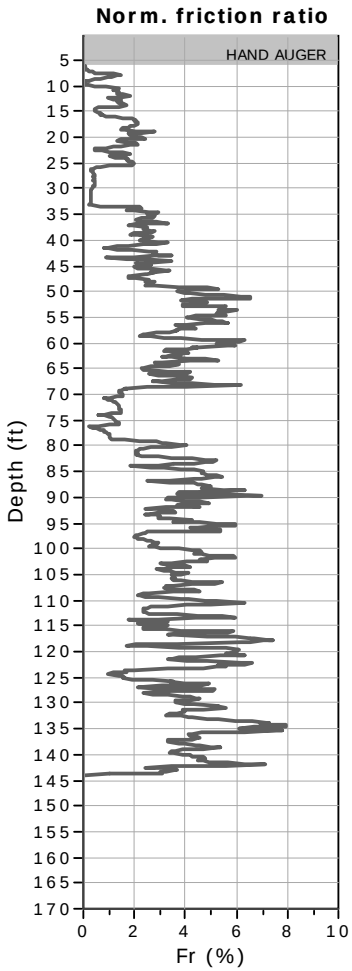
Surface Elevation: 346.14 ft

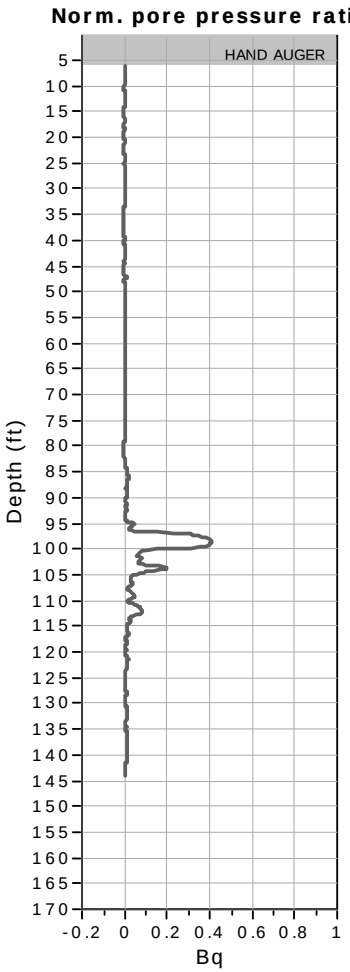
Coords: X:6186374.54, Y:2368141.64

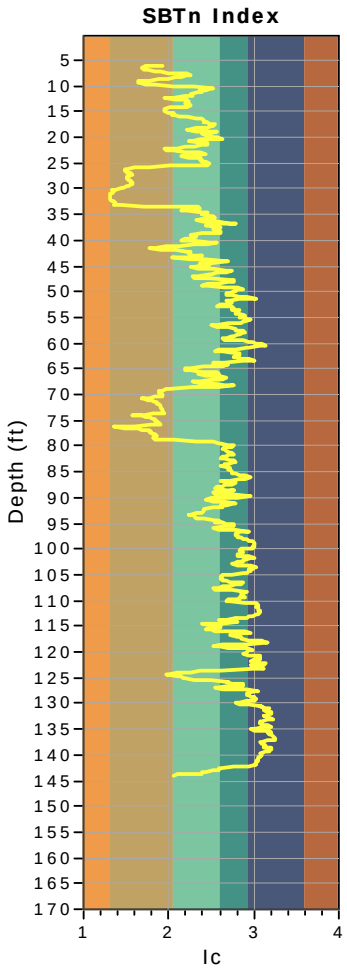
Project: California High-Speed Train

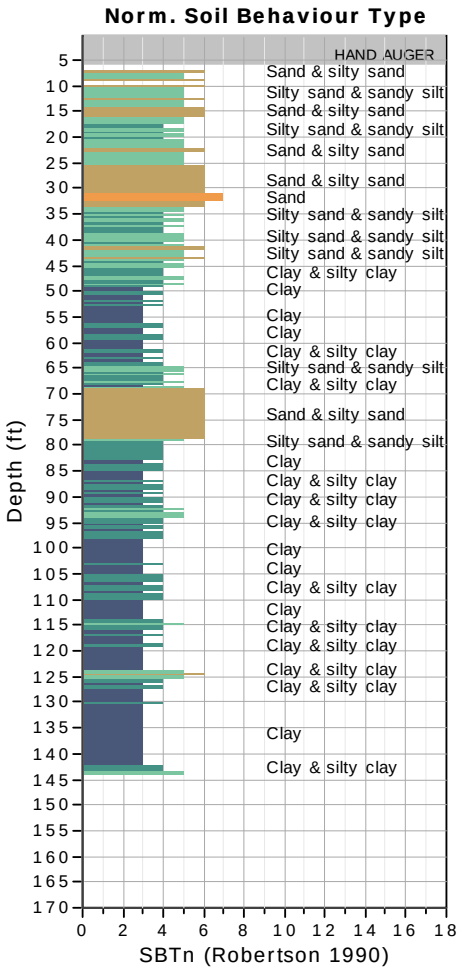
Location: Fresno-Bakersfield











SBTn legend

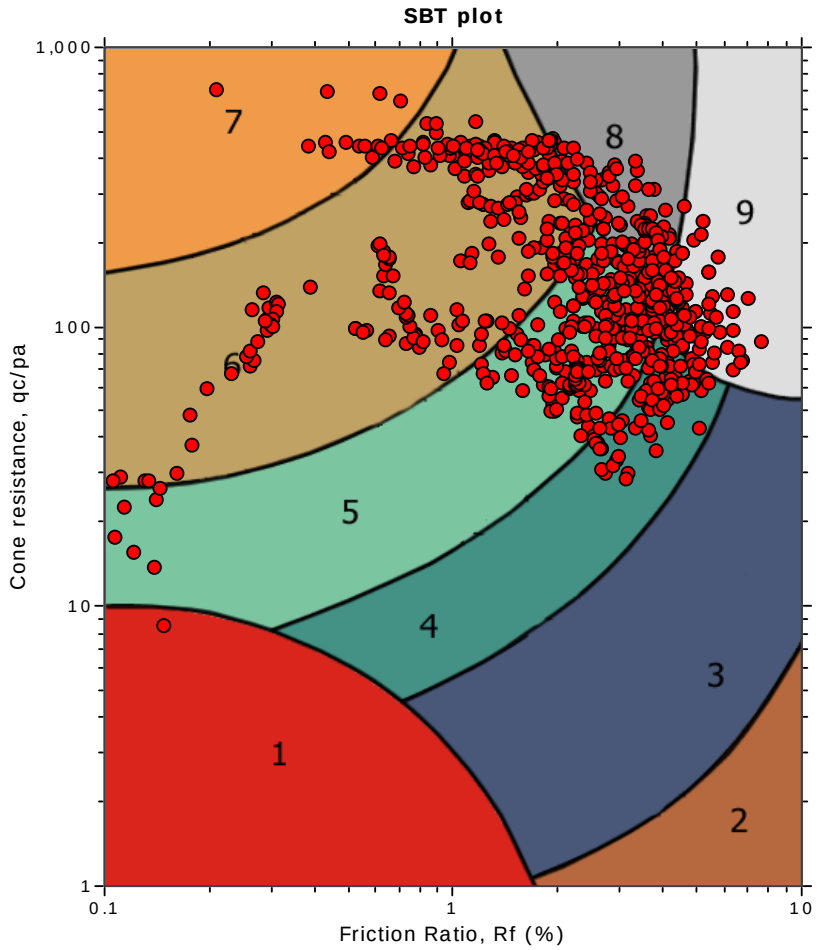
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

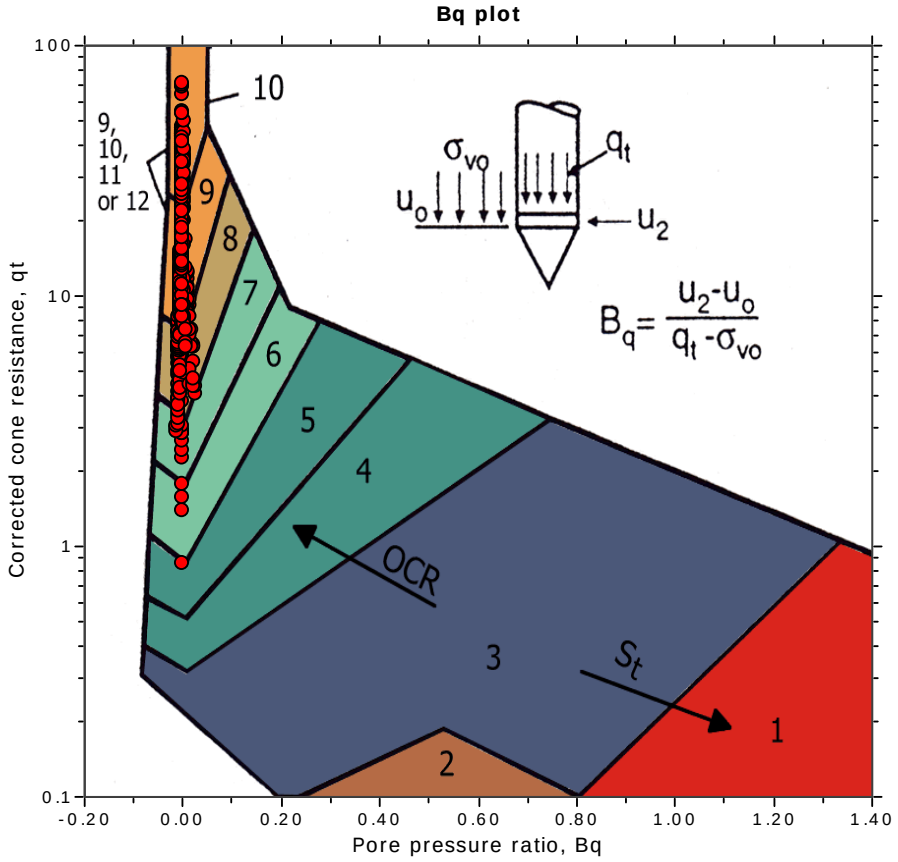
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0312CPT
Total depth: 129.59 ft
Surface Elevation: 346.17 ft
Coords: X:6188728.45, Y:2365238.86

SBT - Bq plots



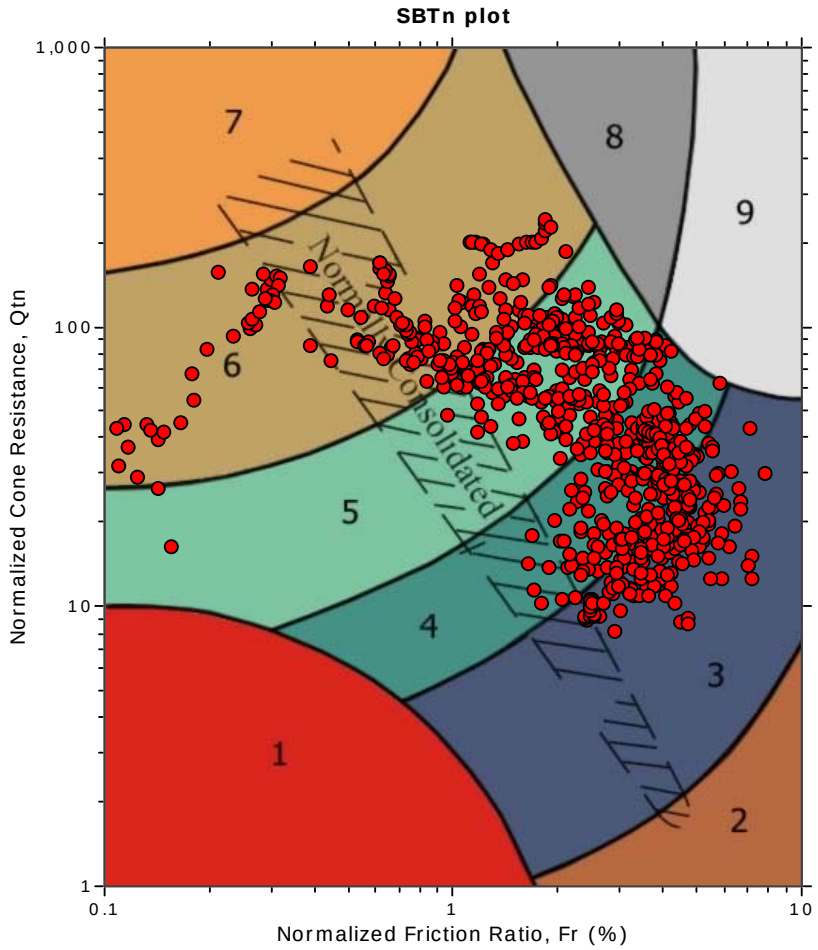


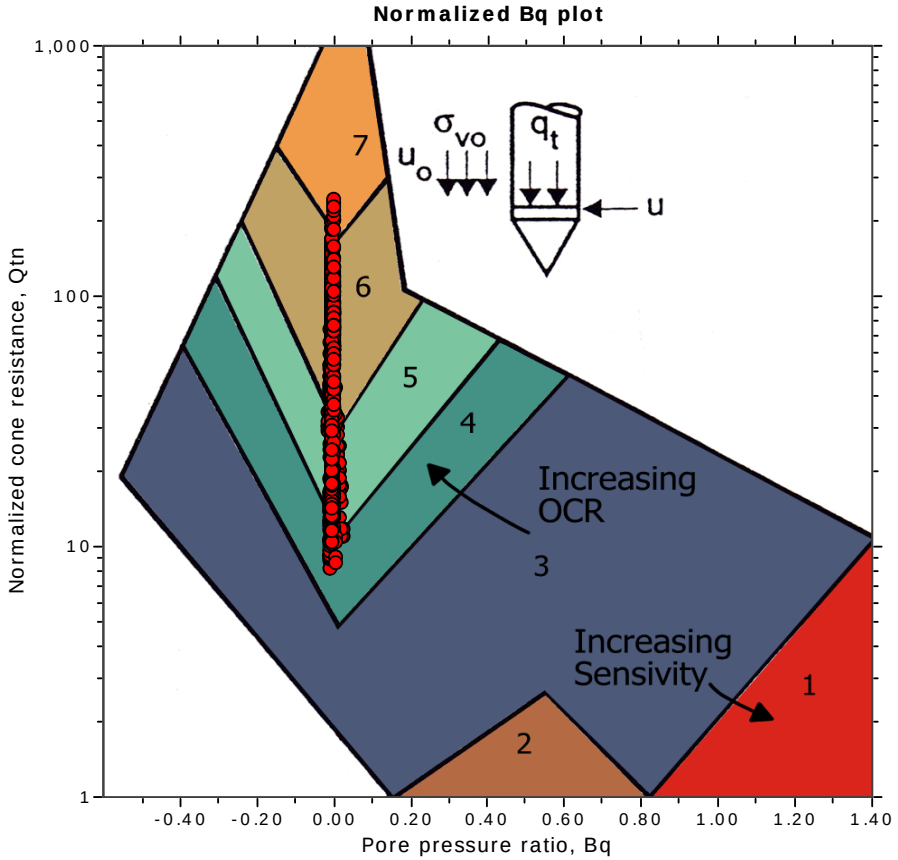
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0312CPT

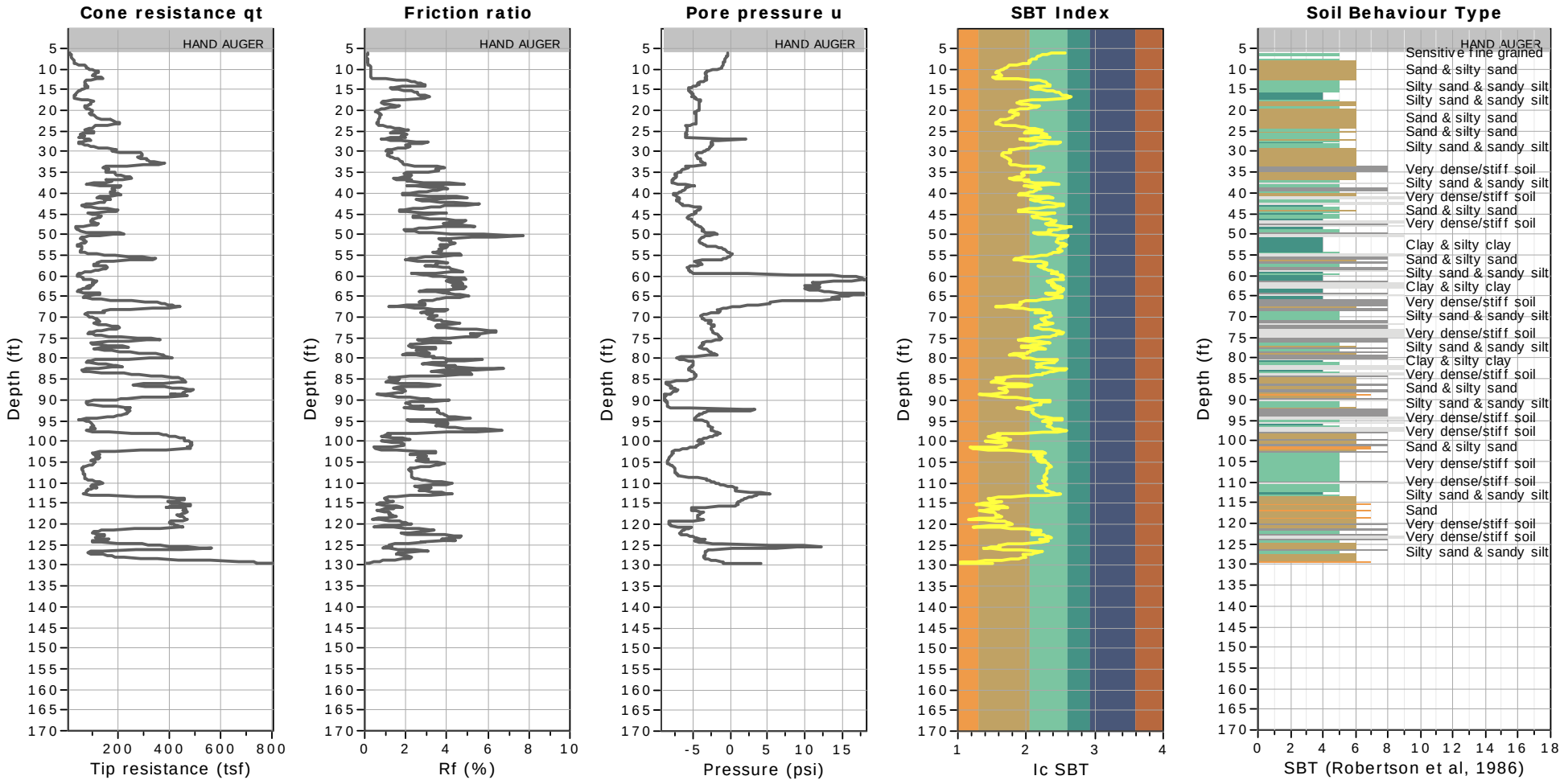
Total depth: 129.59 ft

Surface Elevation: 346.17 ft

Coords: X:6188728.45, Y:2365238.86

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

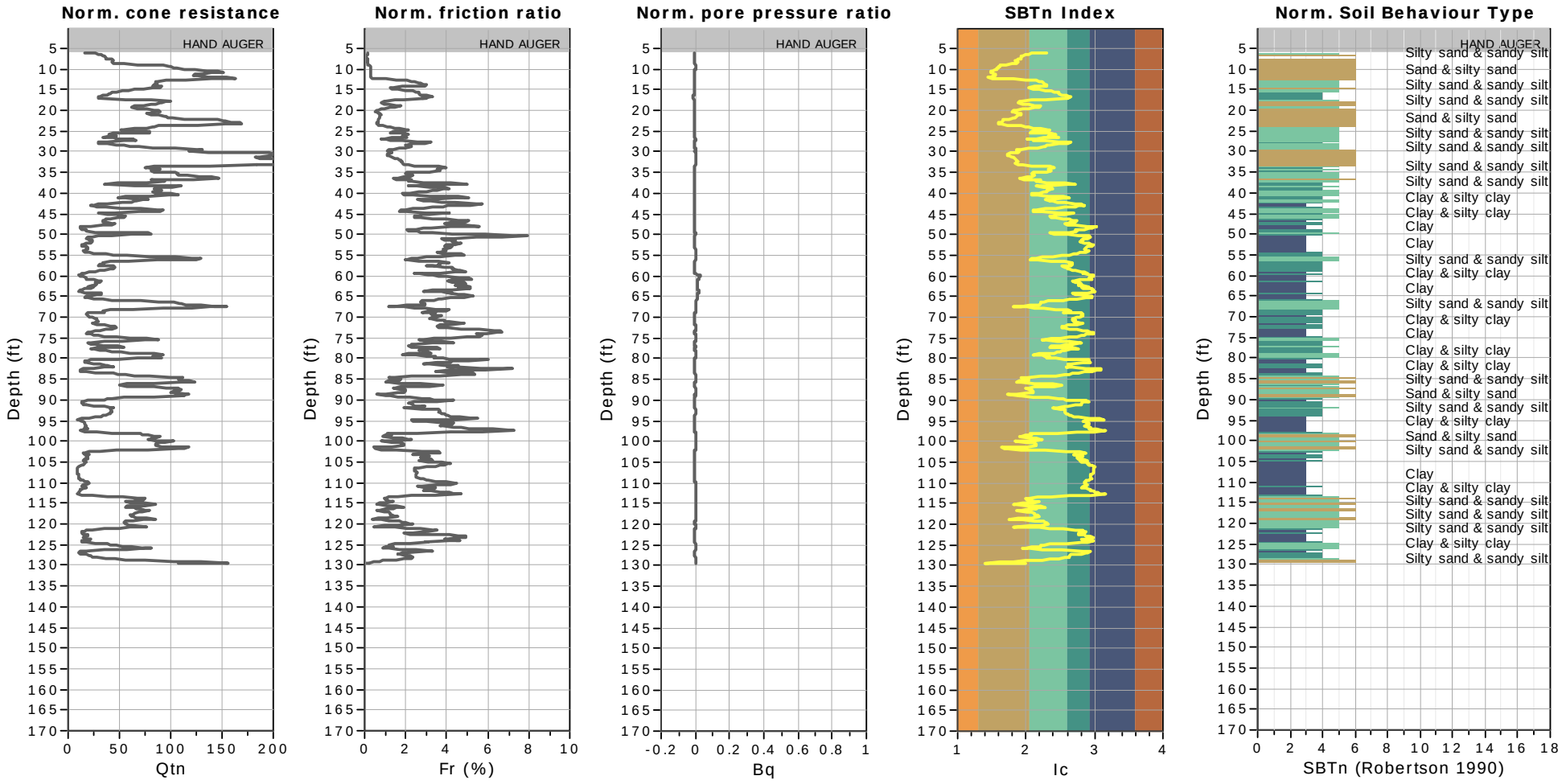
Location: Fresno-Bakersfield

CPT: S0312CPT

Total depth: 129.59 ft

Surface Elevation: 346.17 ft

Coords: X:6188728.45, Y:2365238.86

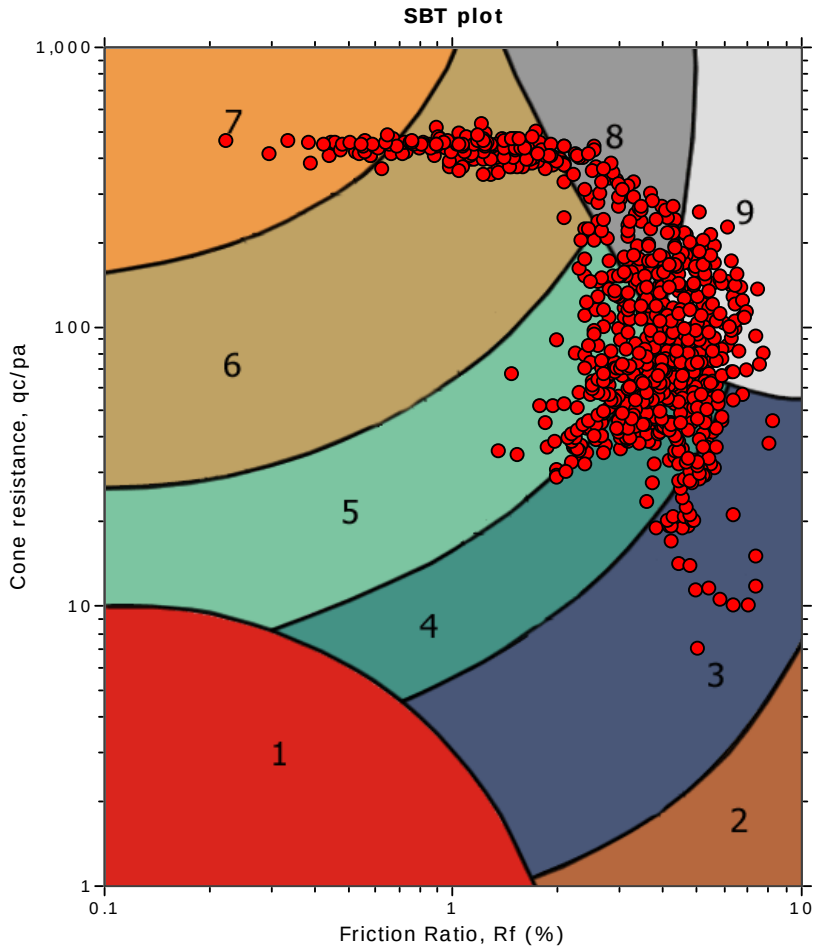


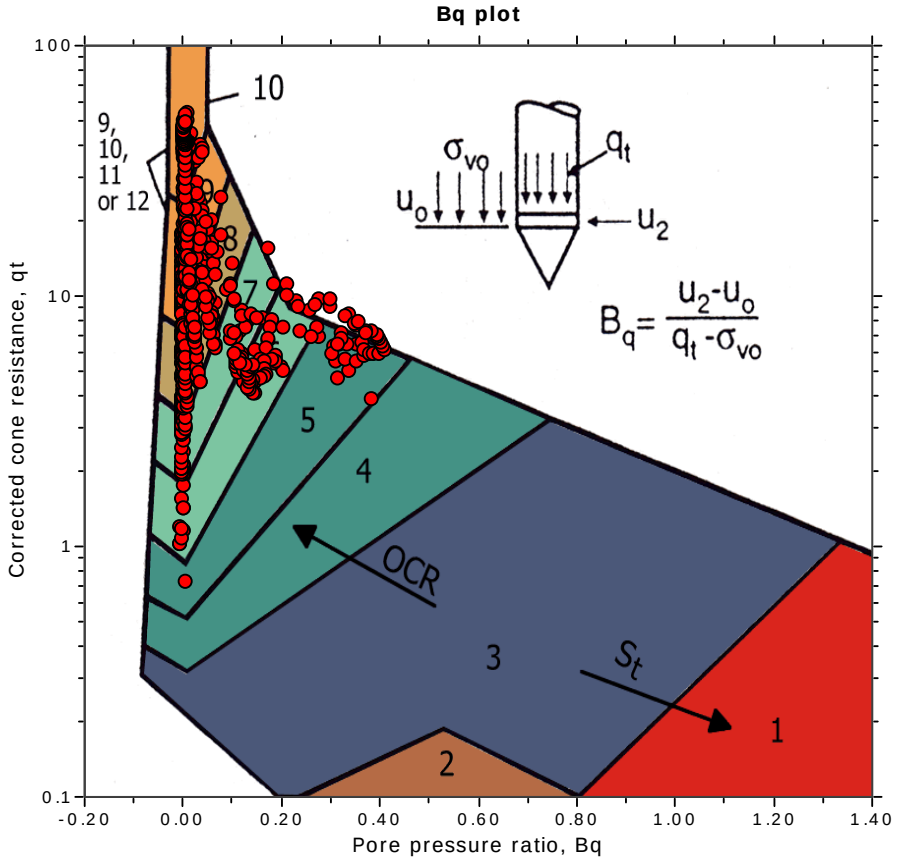
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0314CPT
Total depth: 150.26 ft
Surface Elevation: 343.70 ft
Coords: X:6191087.81, Y:2362595.04

SBT - Bq plots



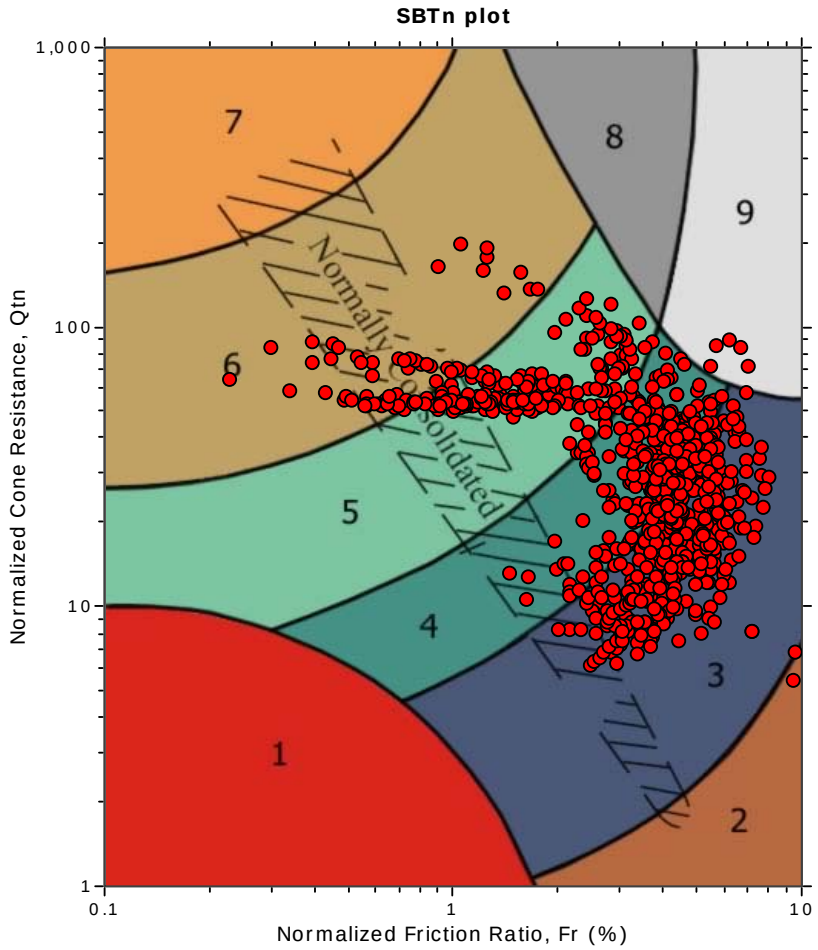


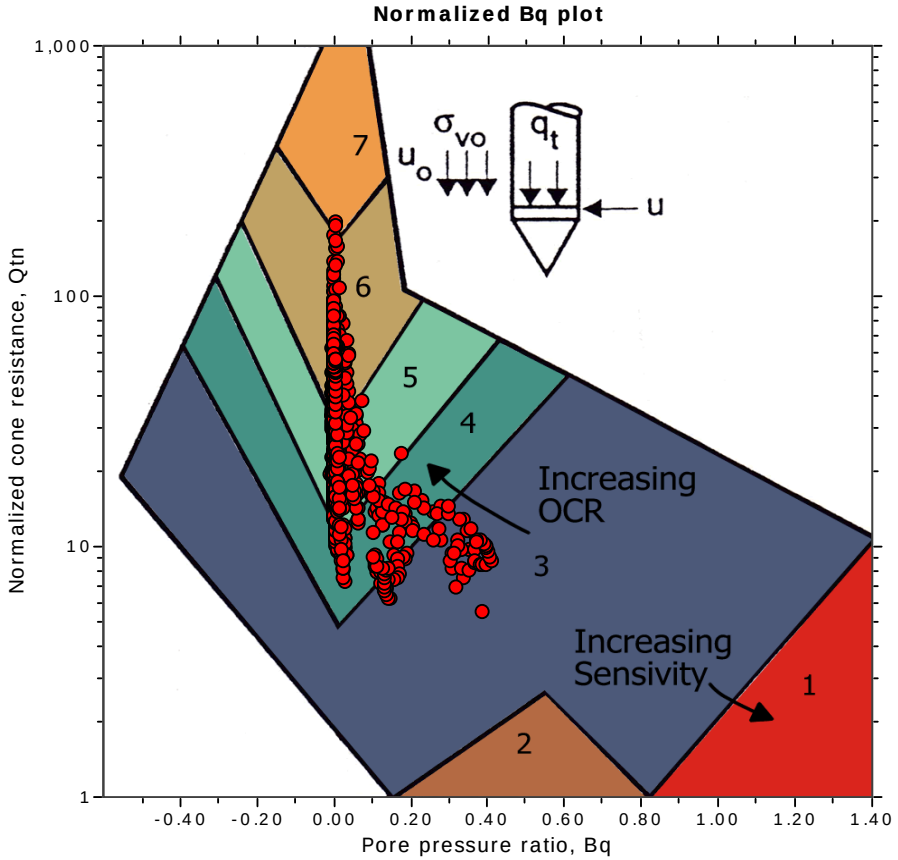
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0314CPT

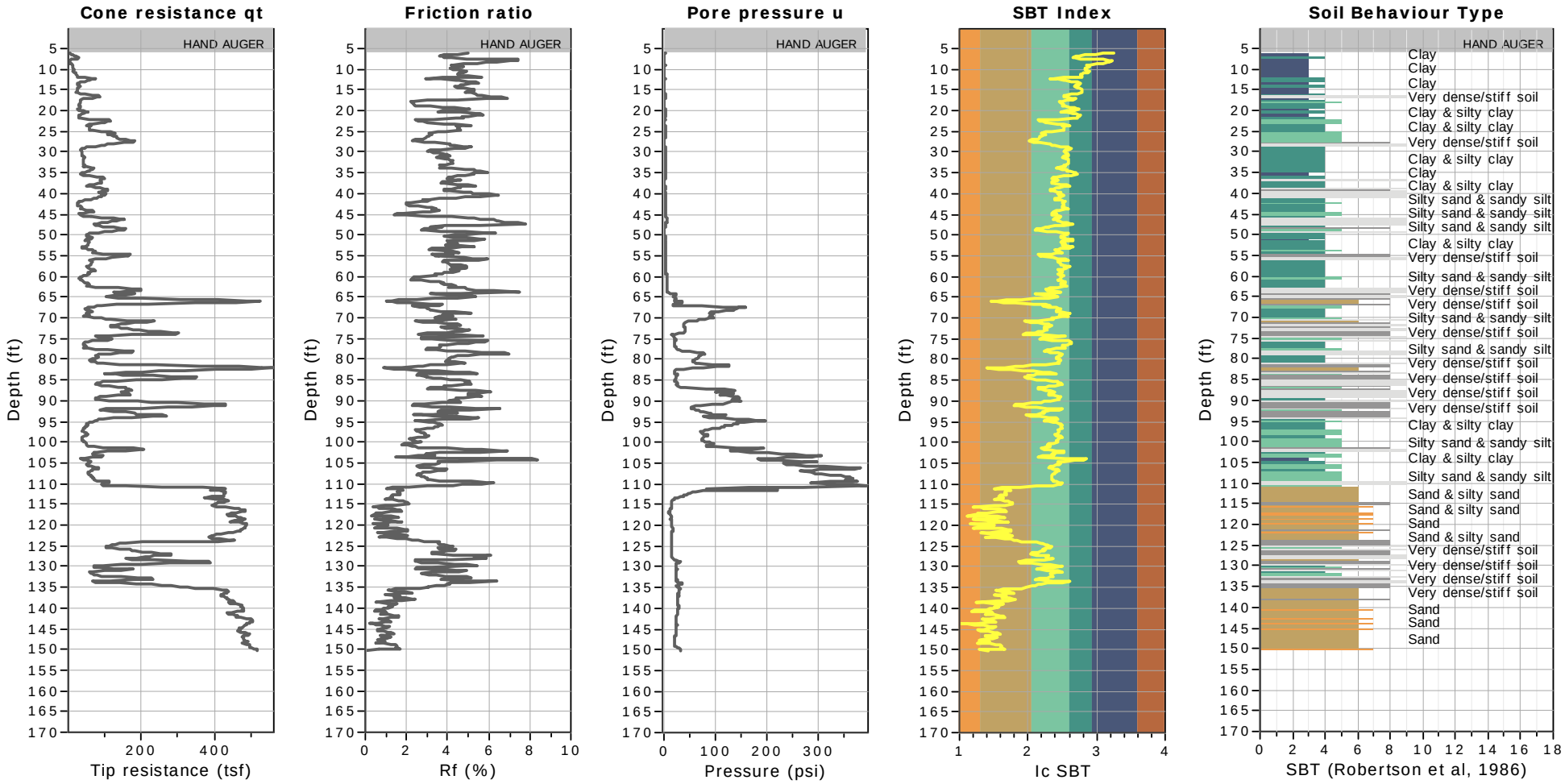
Total depth: 150.26 ft

Surface Elevation: 343.70 ft

Coords: X:6191087.81, Y:2362595.04

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

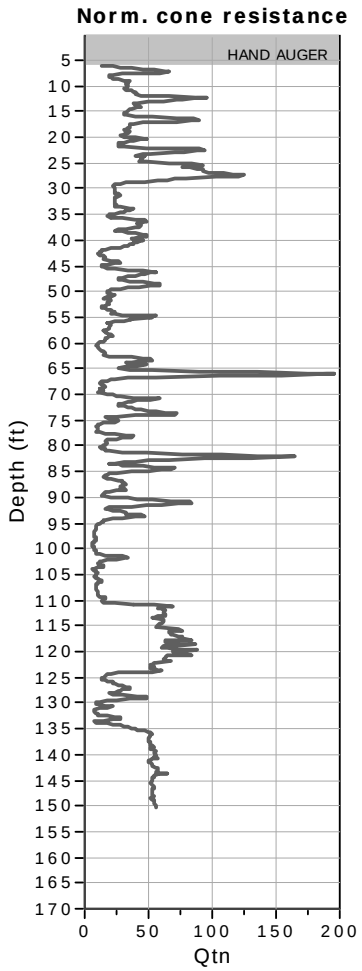
Location: Fresno-Bakersfield

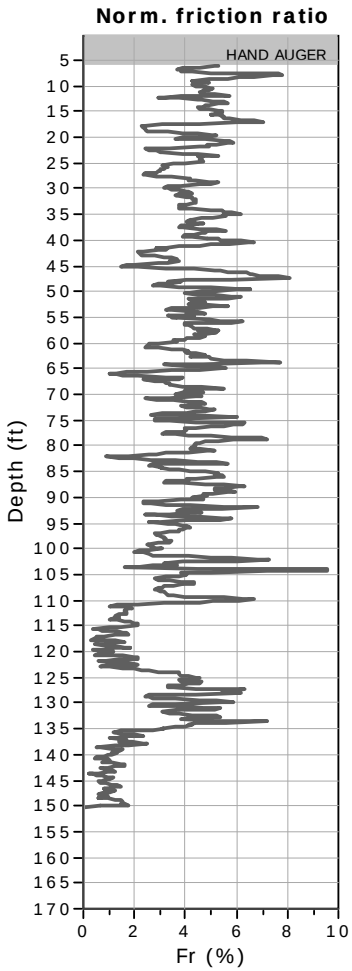
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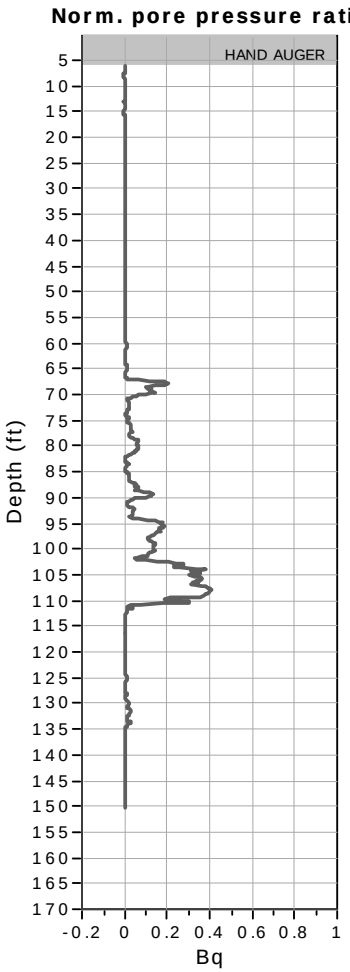
Total depth: 150.26 ft

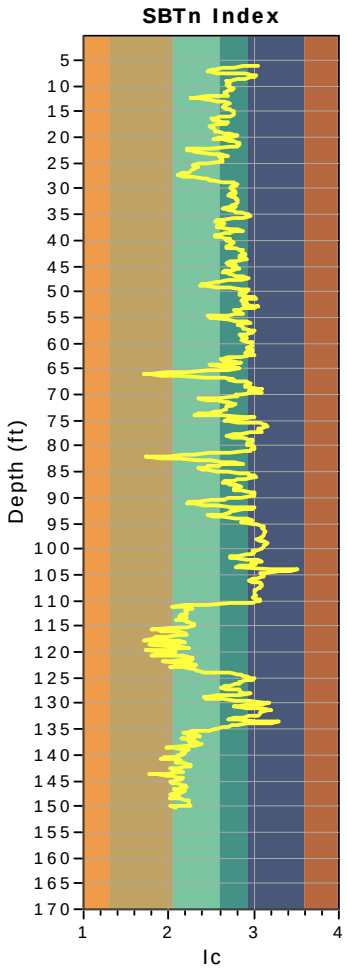
Surface Elevation: 343.70 ft

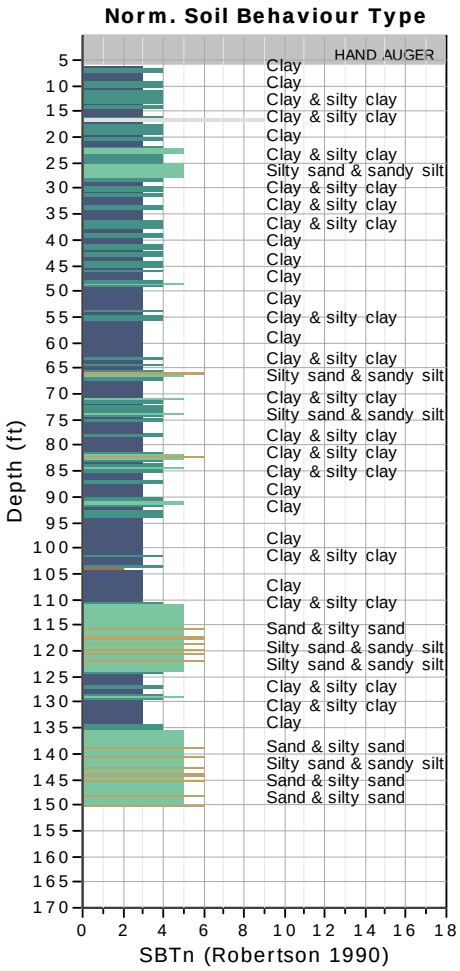
Coords: X:6191087.81, Y:2362595.04









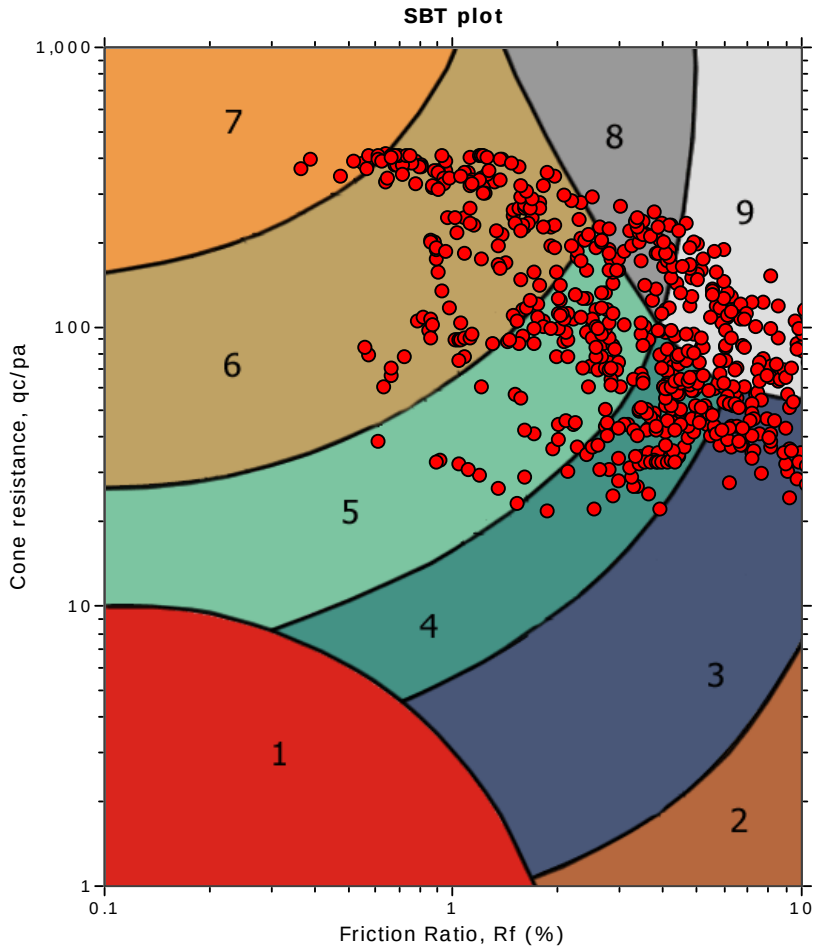


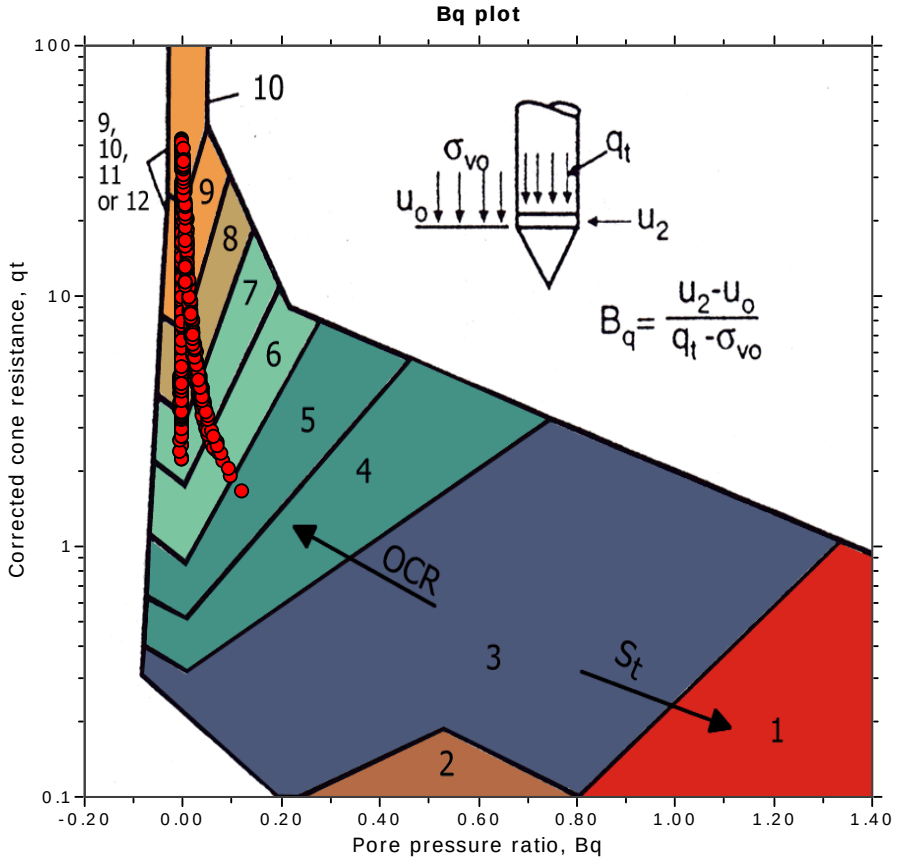
SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots



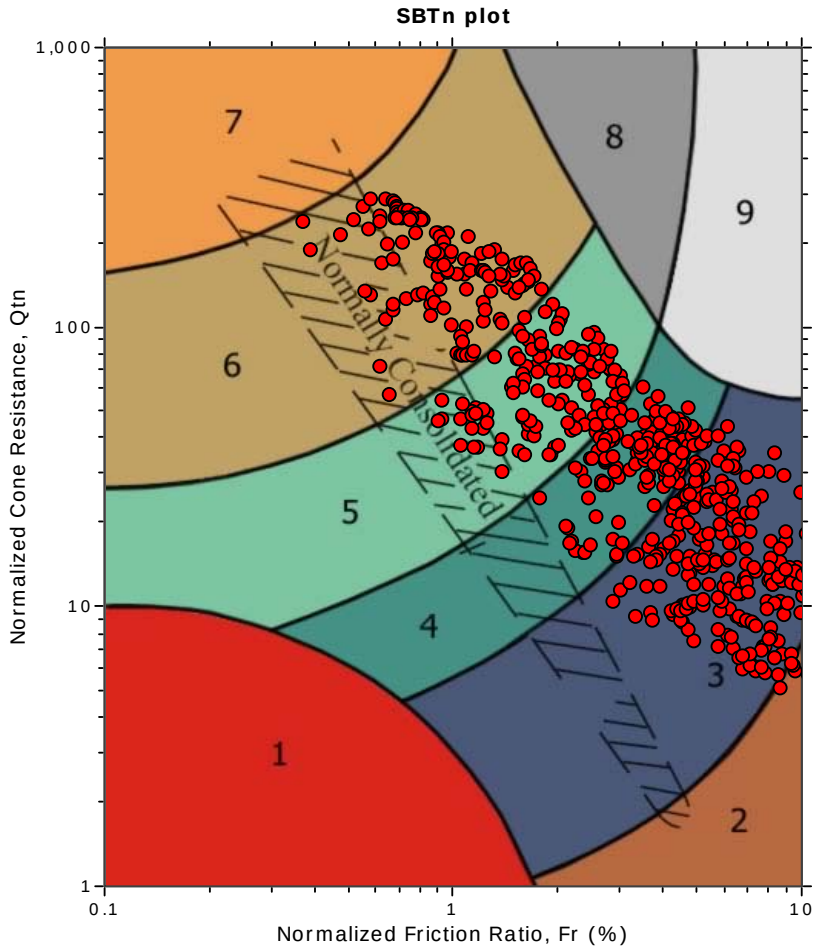


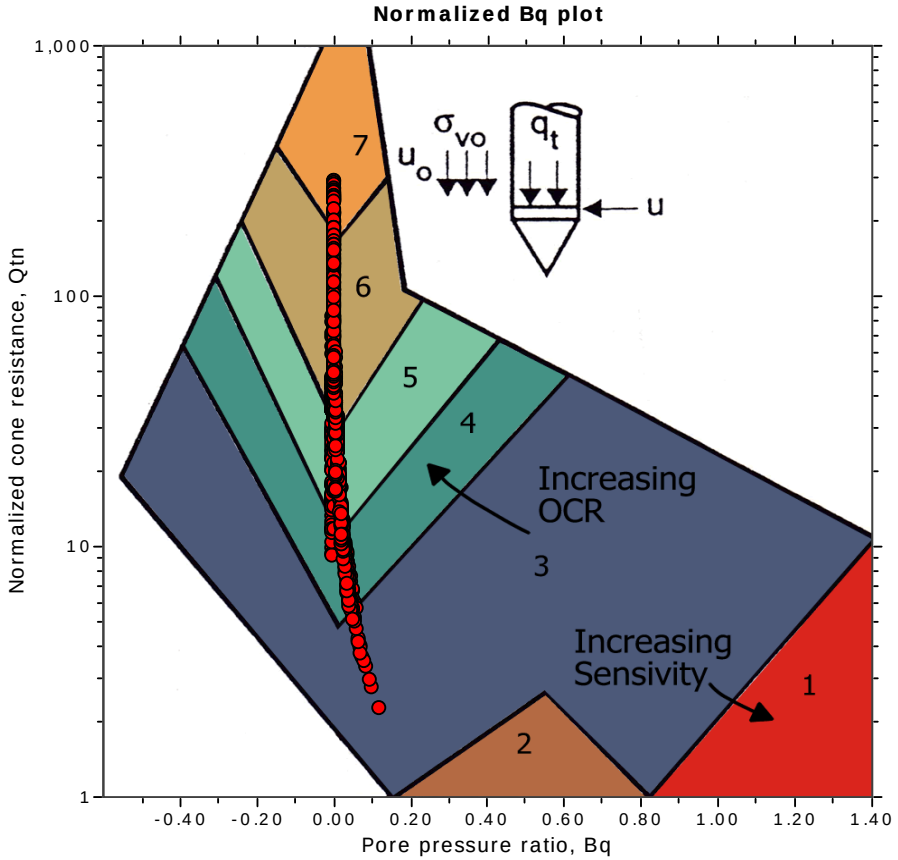
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0315CPT

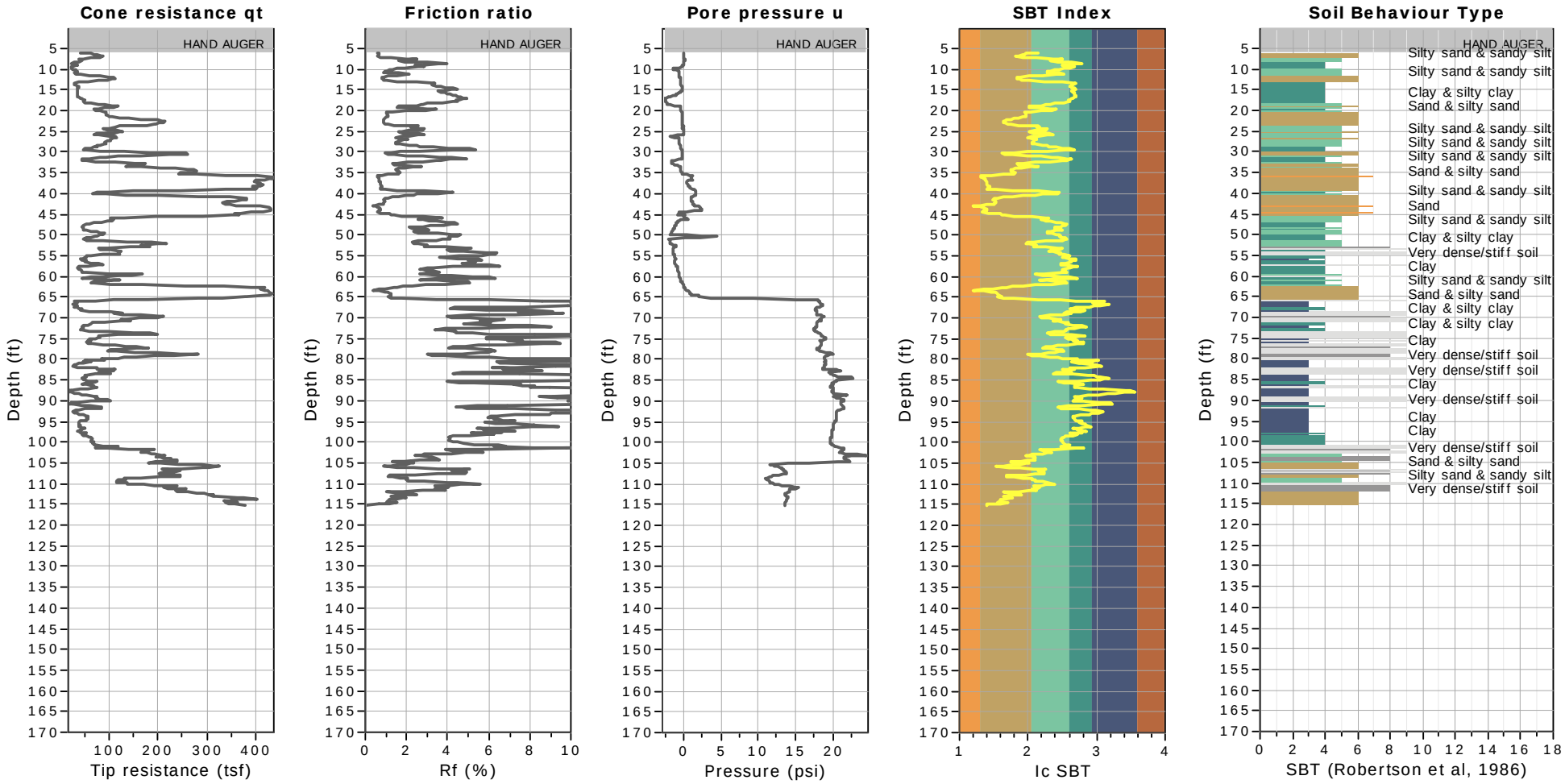
Total depth: 115.16 ft

Surface Elevation: 343.41 ft

Coords: X:6192801.44, Y:2361117.73

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0315CPT

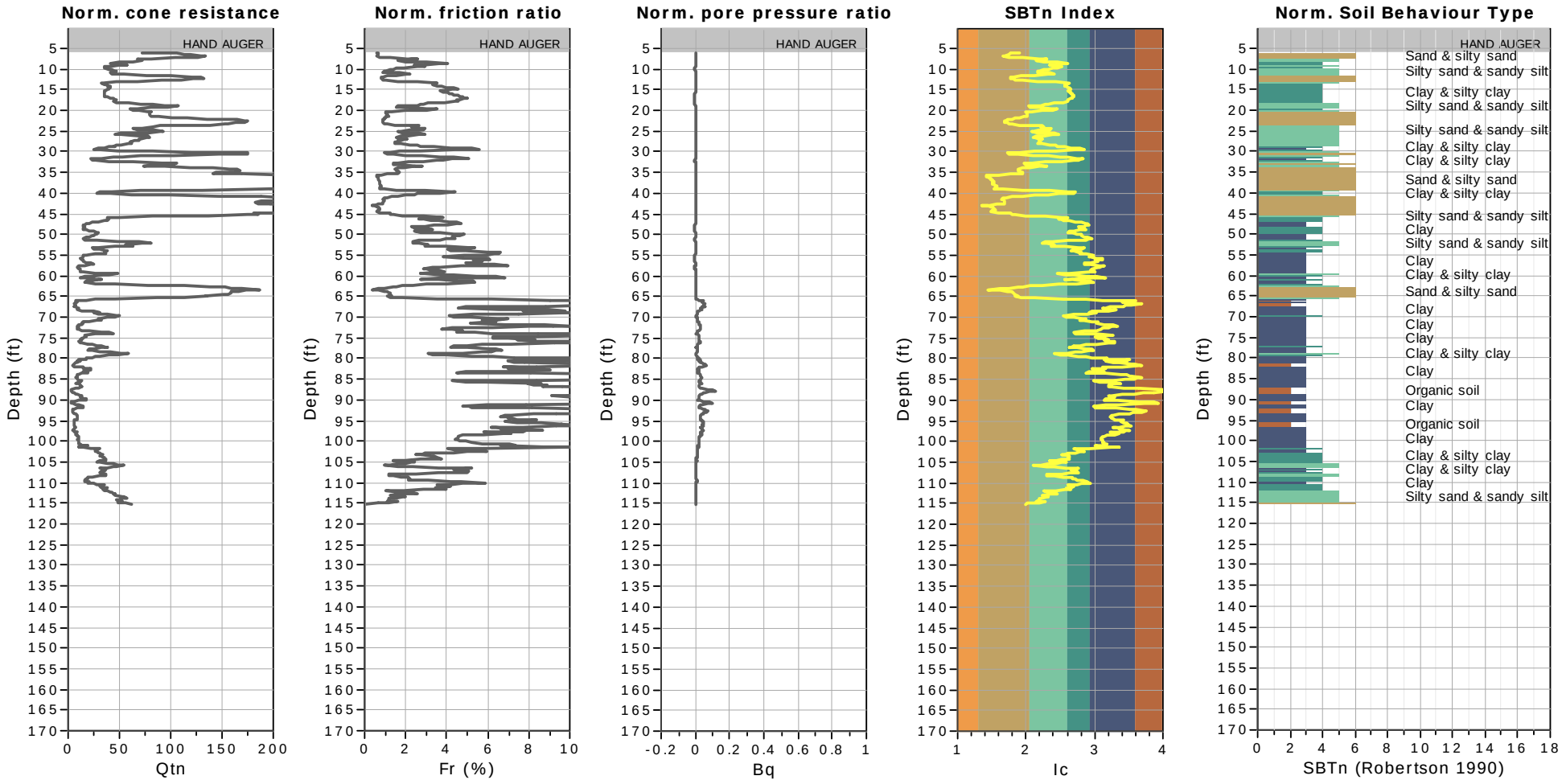
Total depth: 115.16 ft

Surface Elevation: 343.41 ft

Coords: X:6192801.44, Y:2361117.73

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

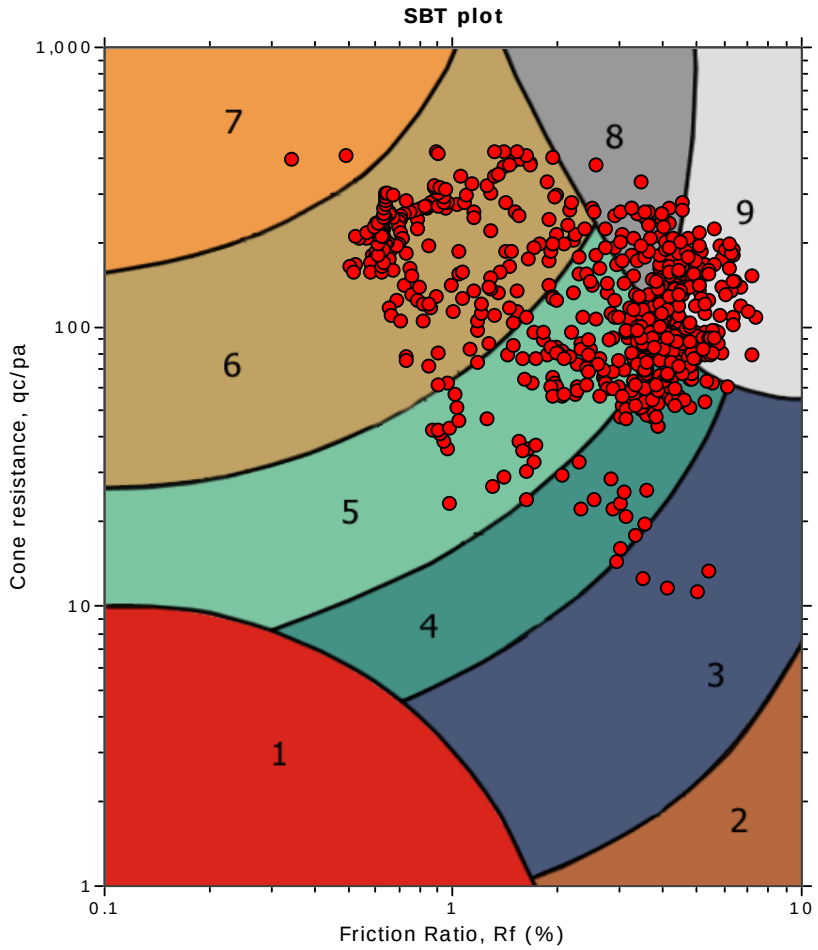
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

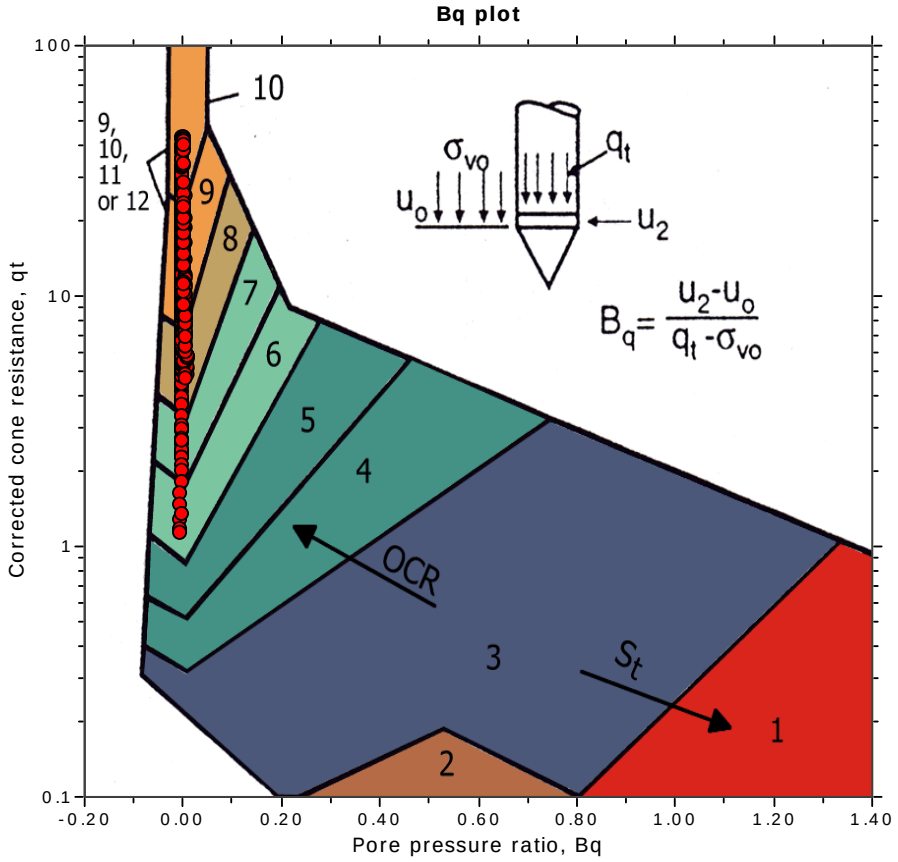
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0317CPT
Total depth: 110.07 ft
Surface Elevation: 341.57 ft
Coords: X:6194336.71, Y:2359554.98

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0317CPT

Total depth: 110.07 ft

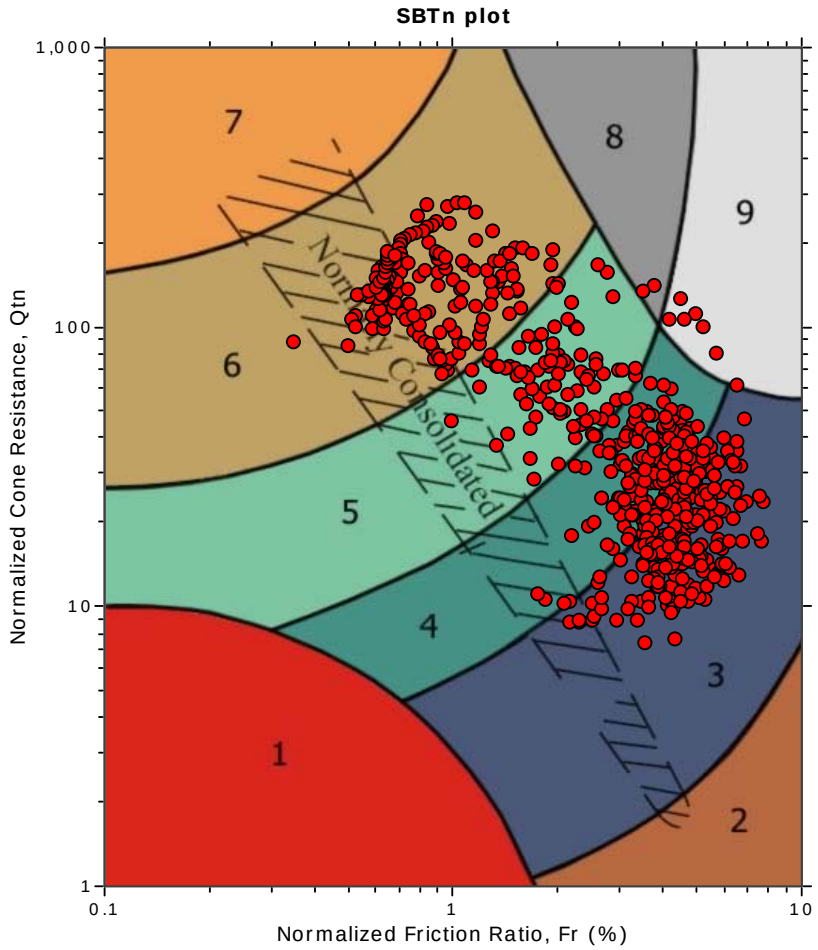
Surface Elevation: 341.57 ft

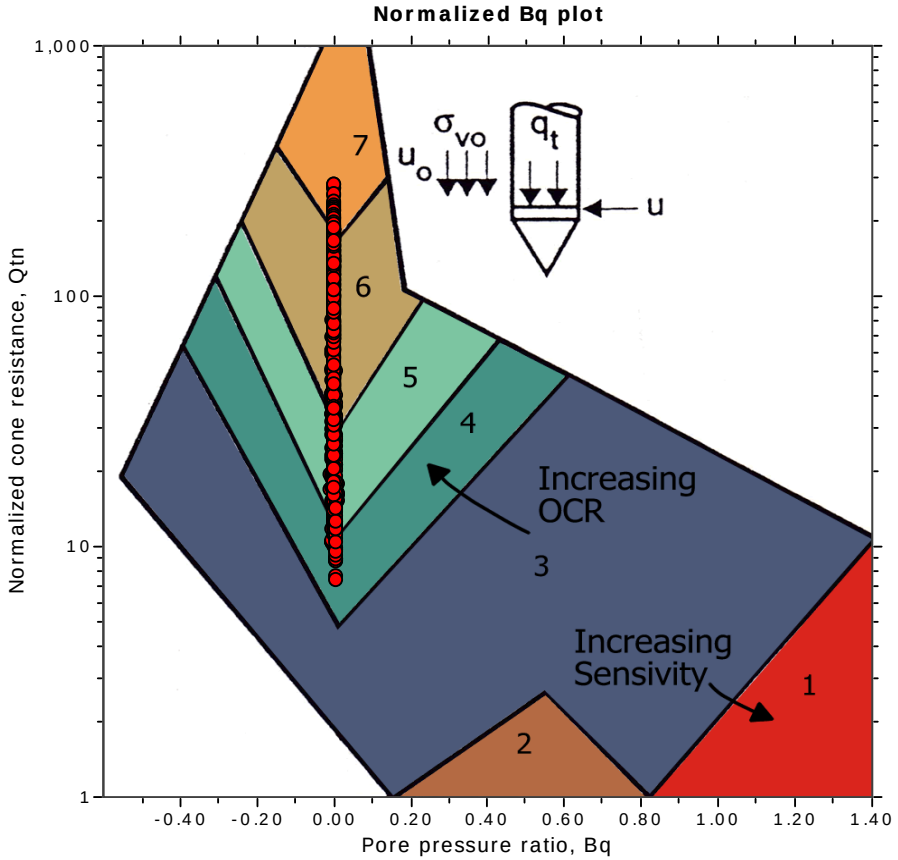
Coords: X:6194336.71, Y:2359554.98

Project: California High-Speed Train

Location: Fresno-Bakersfield

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

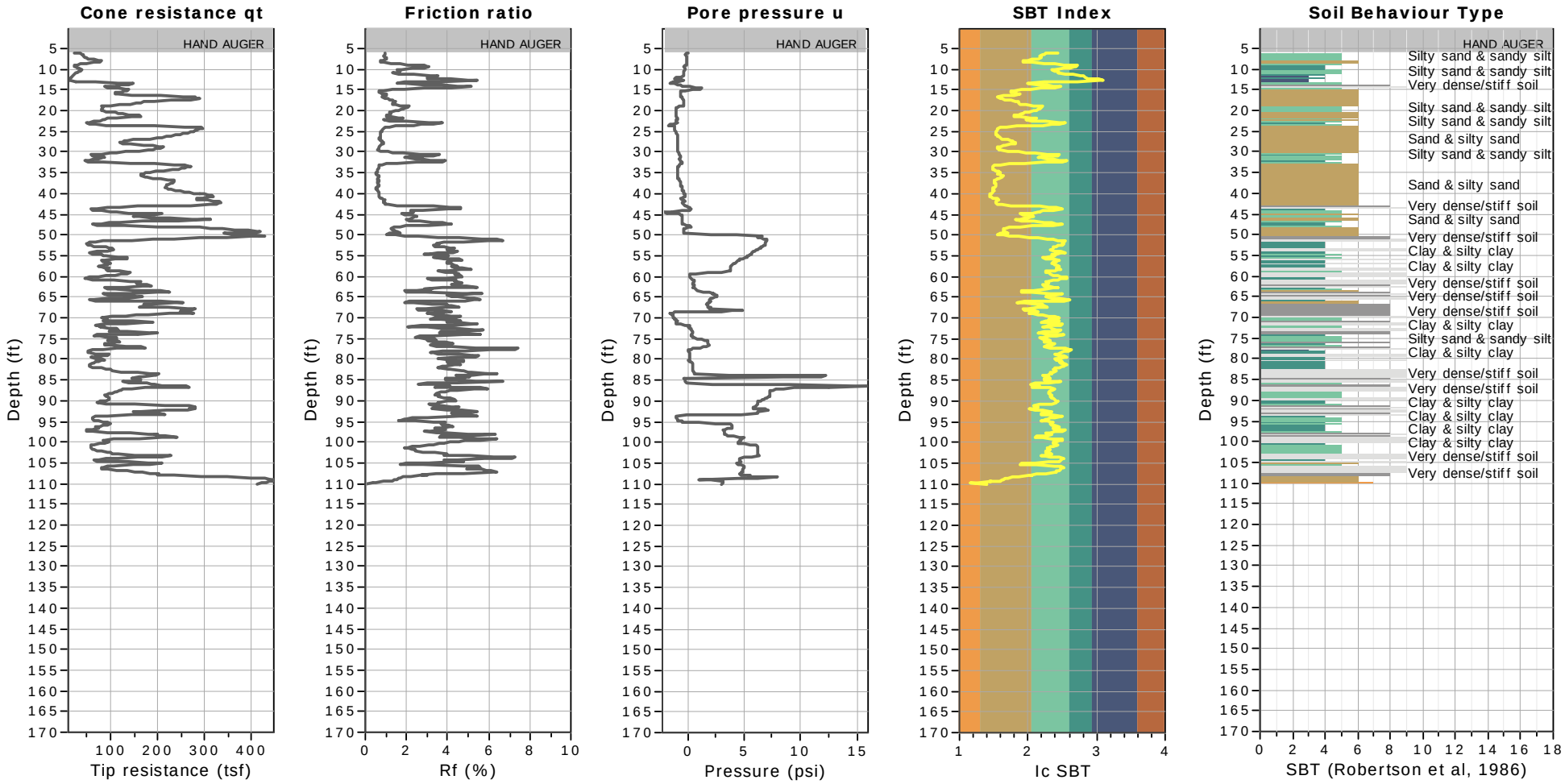
Location: Fresno-Bakersfield

CPT: S0317CPT

Total depth: 110.07 ft

Surface Elevation: 341.57 ft

Coords: X:6194336.71, Y:2359554.98



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0317CPT

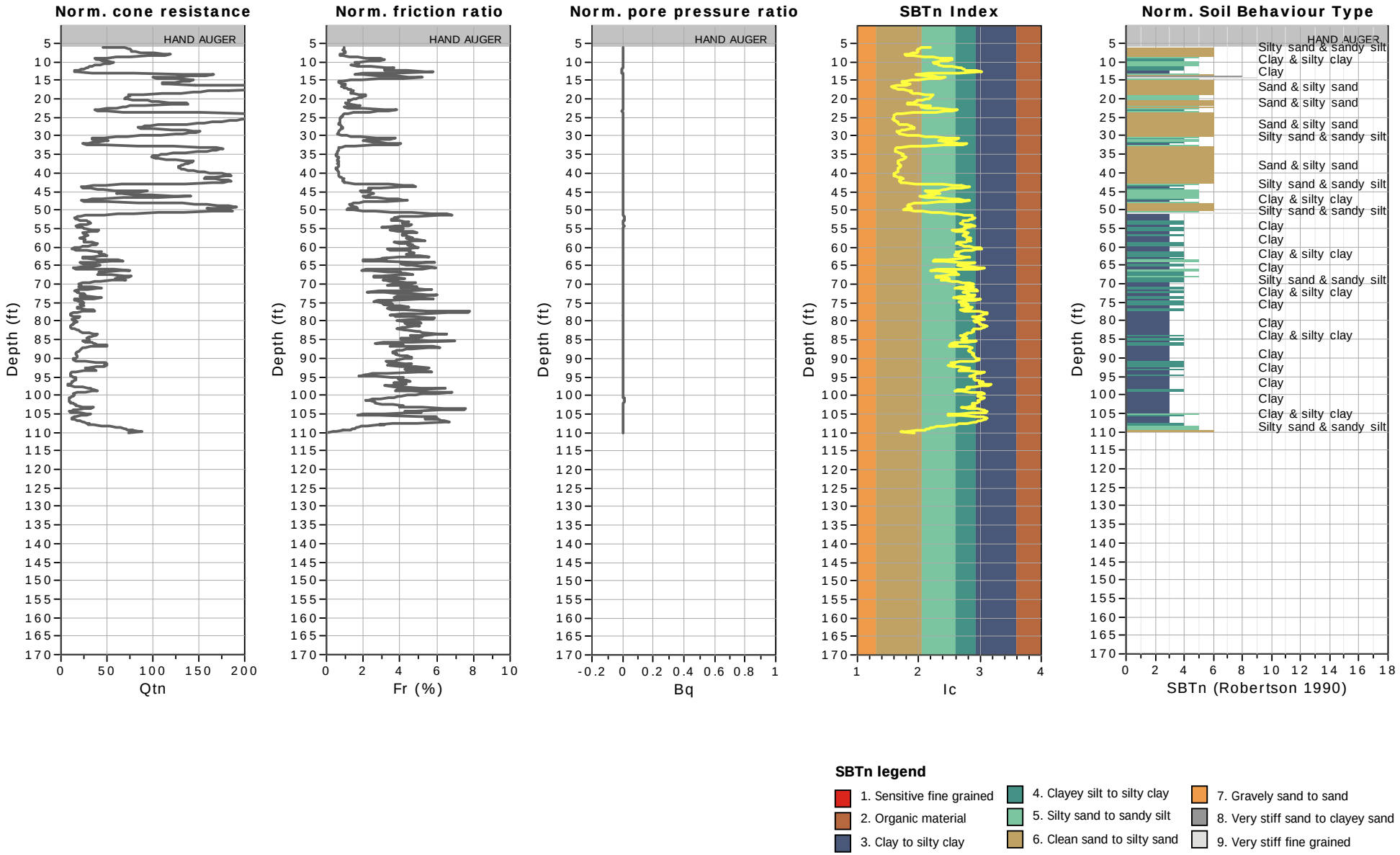
Total depth: 110.07 ft

Surface Elevation: 341.57 ft

Coords: X:6194336.71, Y:2359554.98

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

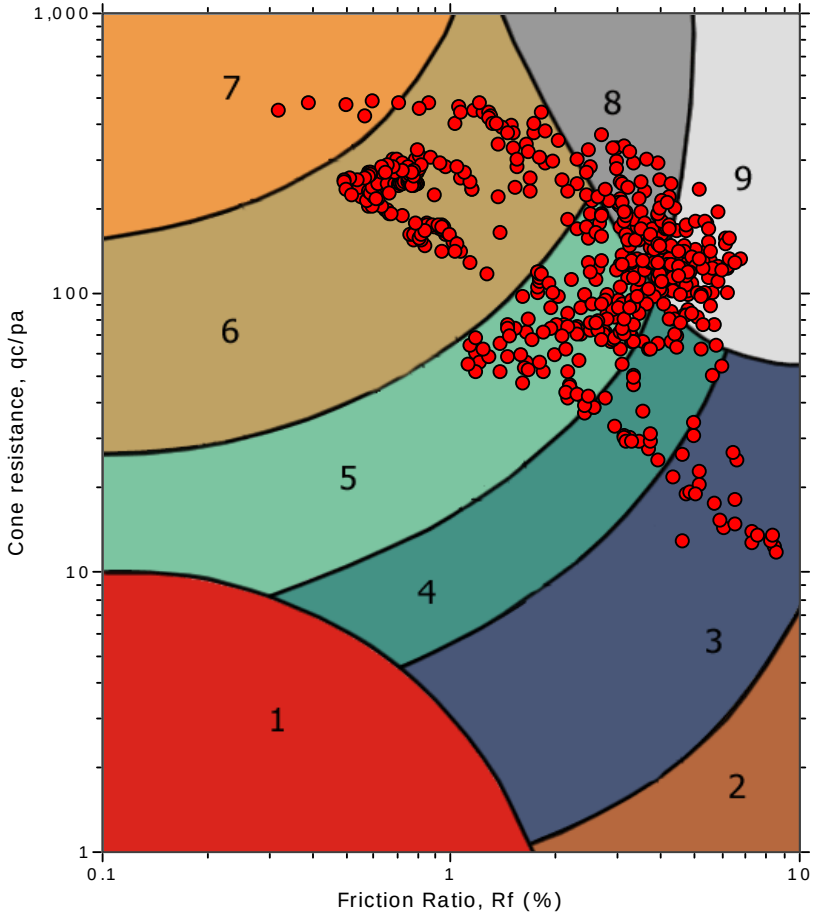
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

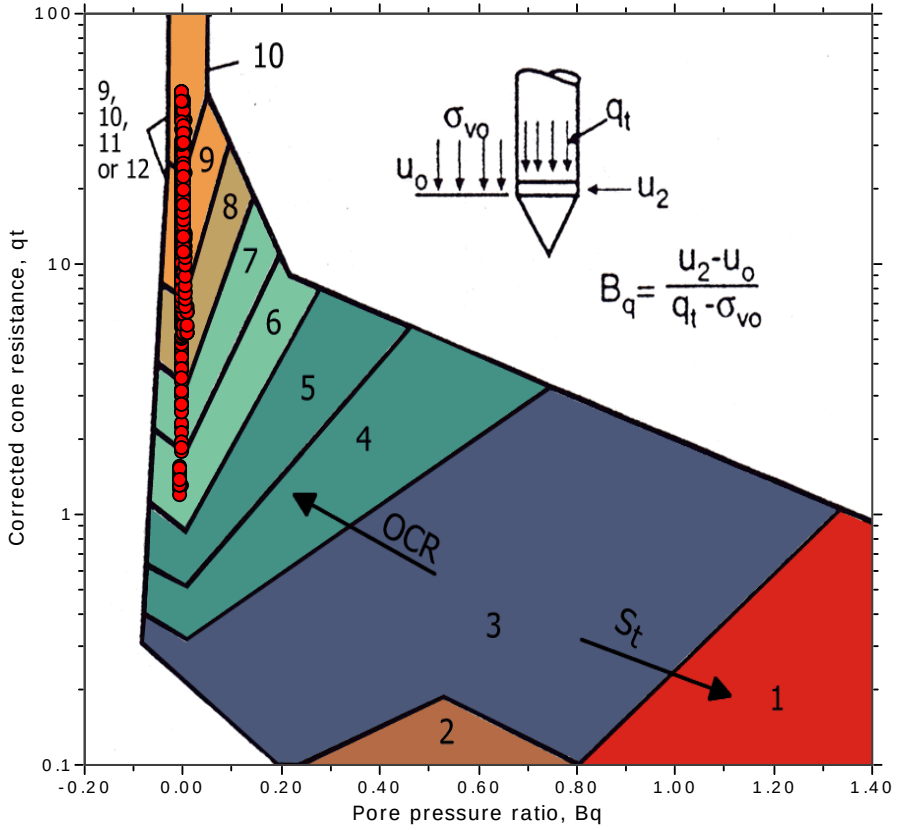
CPT: S0318ACPT
Total depth: 100.07 ft
Surface Elevation: 336.29 ft
Coords: X:6196804.55, Y:2357034.81

SBT - Bq plots

SBT plot



Bq plot



SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0318ACPT

Total depth: 100.07 ft

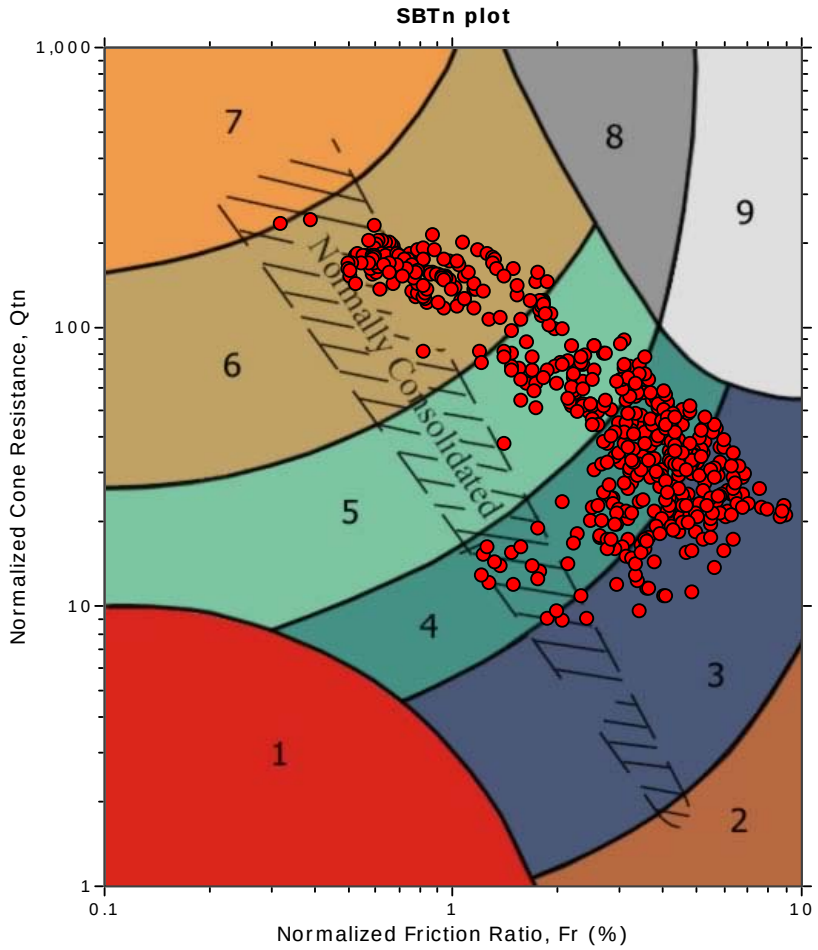
Surface Elevation: 336.29 ft

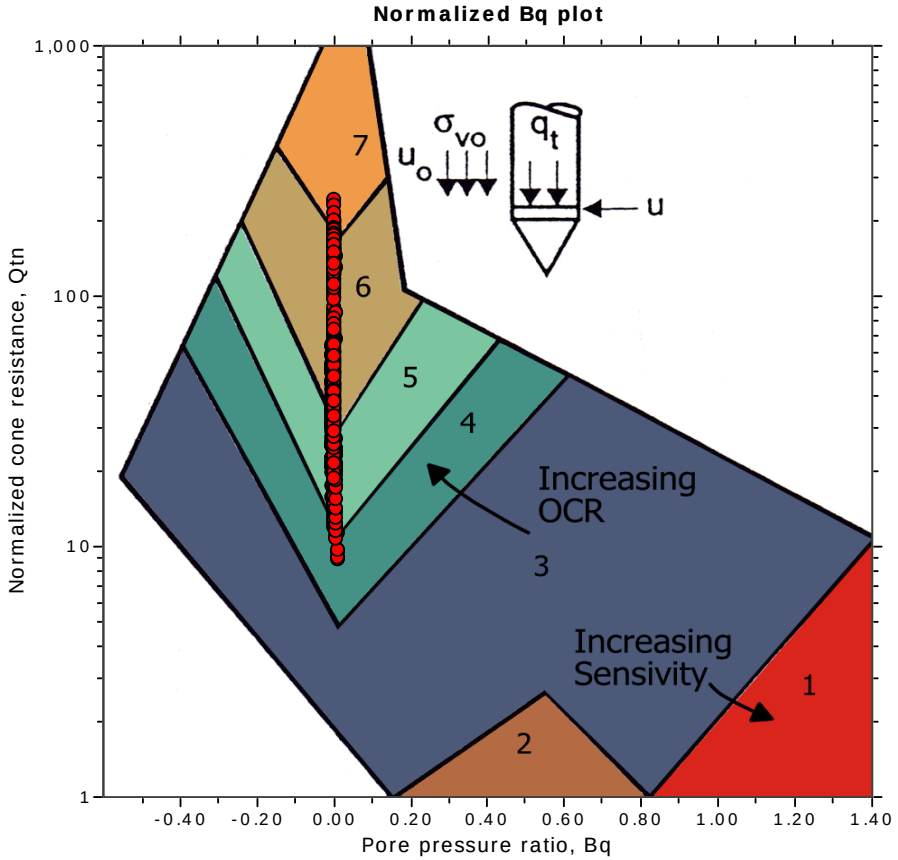
Coords: X:6196804.55, Y:2357034.81

Project: California High-Speed Train

Location: Fresno-Bakersfield

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0318ACPT

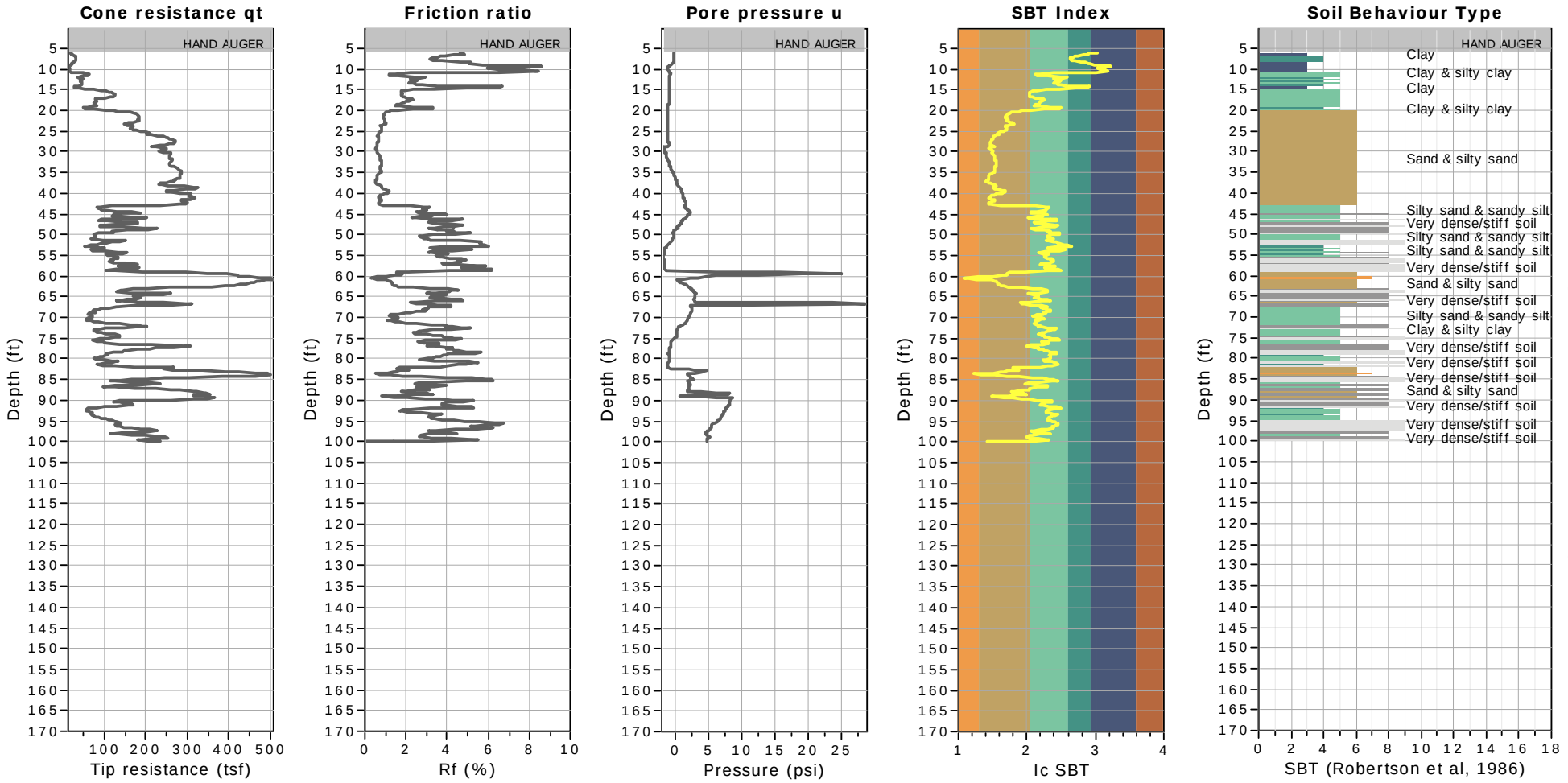
Total depth: 100.07 ft

Surface Elevation: 336.29 ft

Coords: X:6196804.55, Y:2357034.81

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

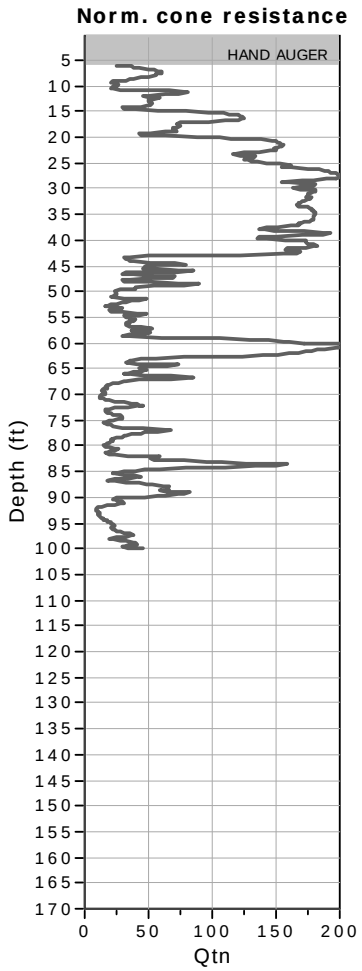
Location: Fresno-Bakersfield

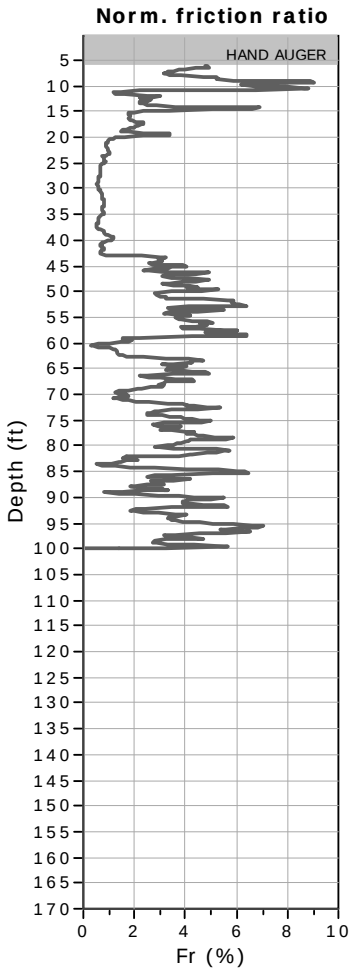
CPT: S0318ACPT

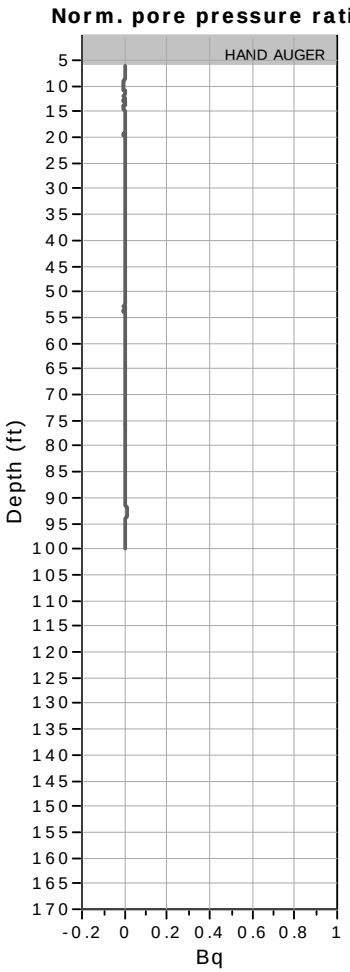
Total depth: 100.07 ft

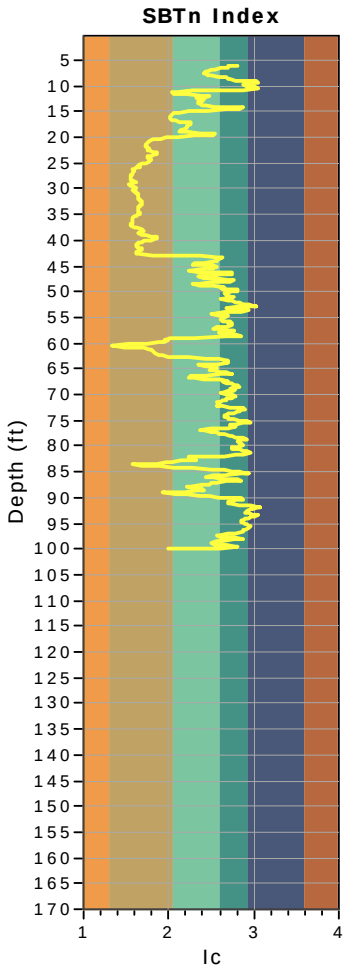
Surface Elevation: 336.29 ft

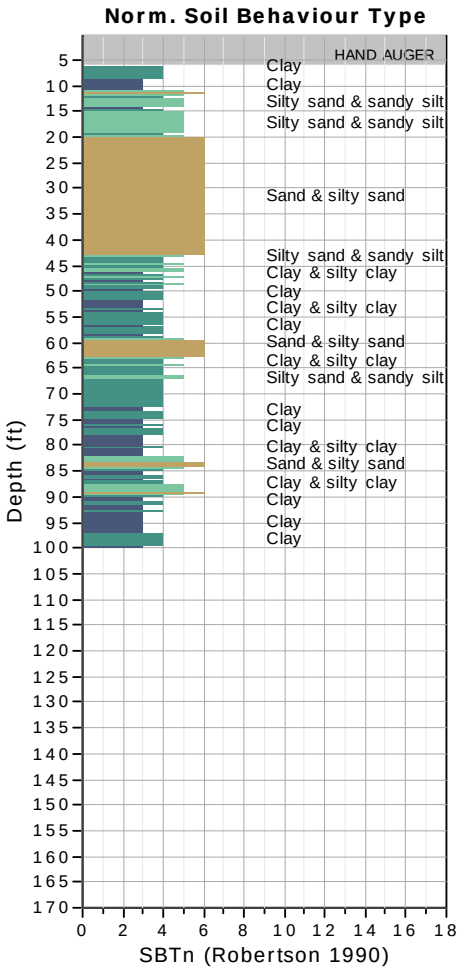
Coords: X:6196804.55, Y:2357034.81











SBTn legend

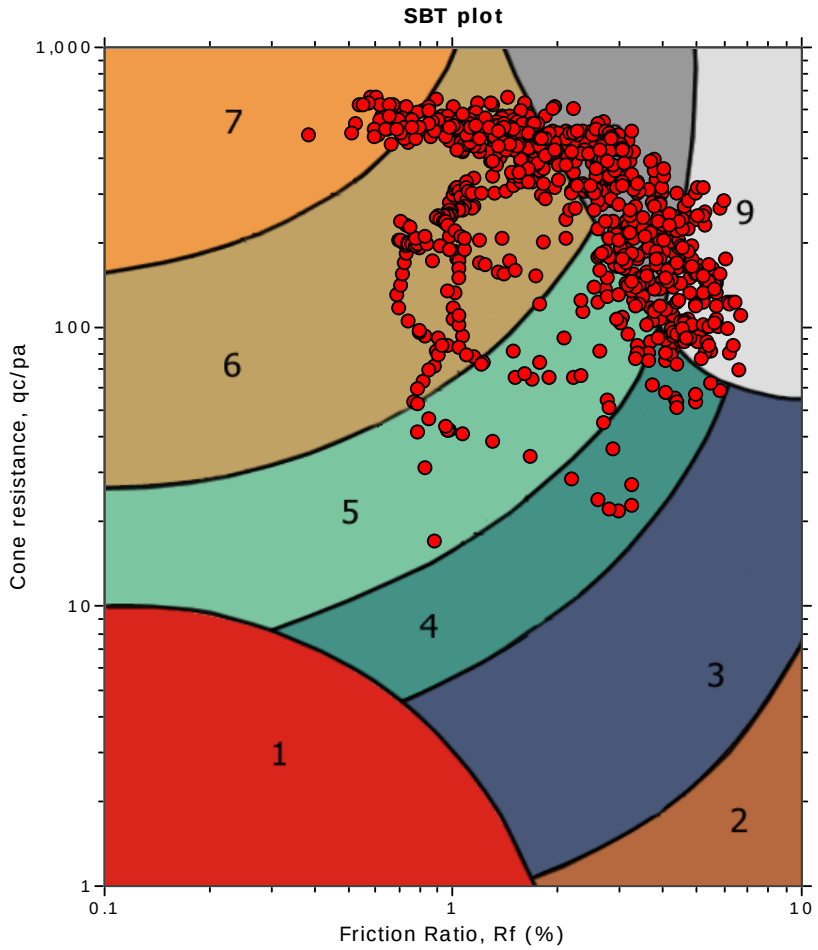
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

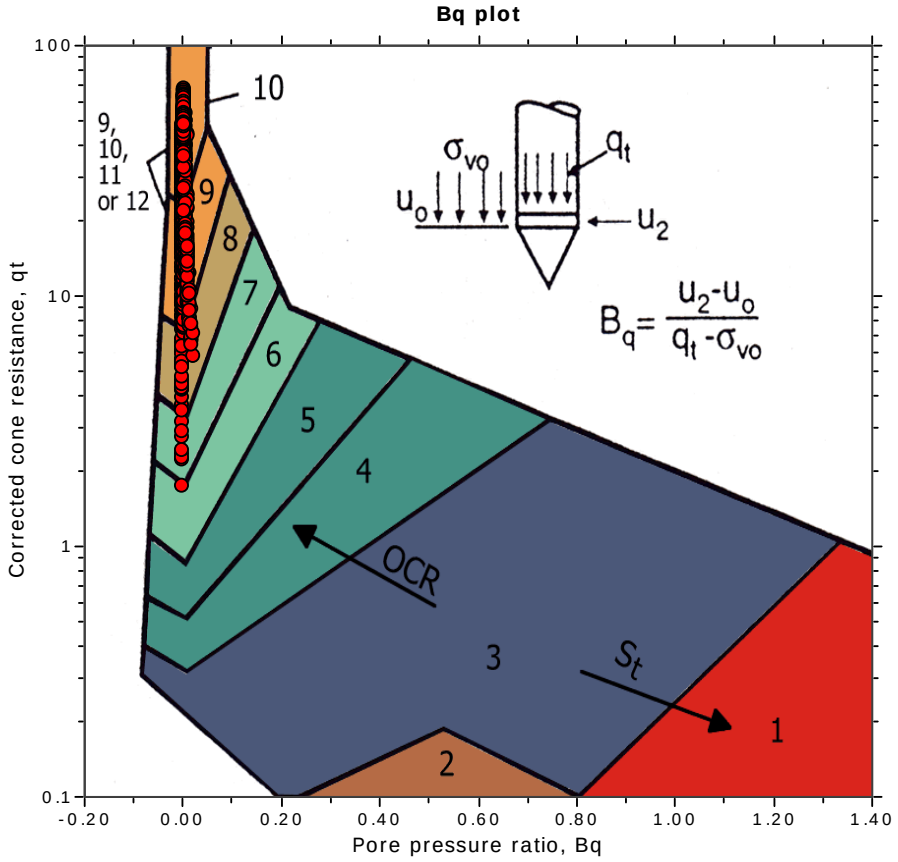
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0318CPT
Total depth: 150.43 ft
Surface Elevation: 338.67 ft
Coords: X:6201308.61, Y:2352411.30

SBT - Bq plots



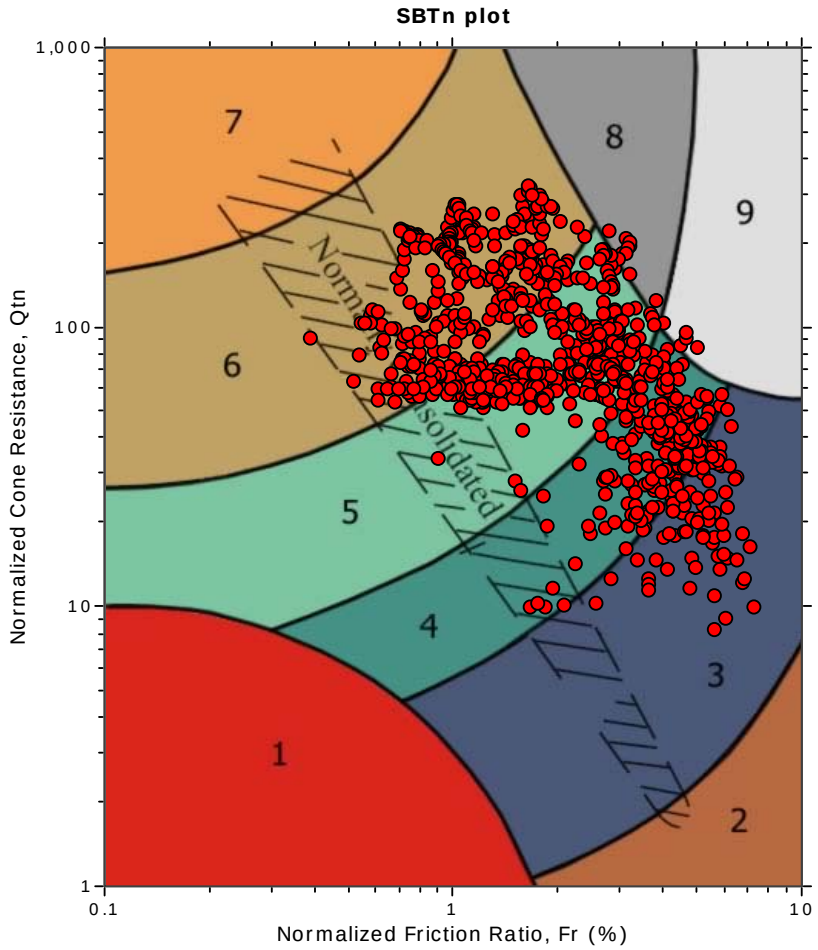


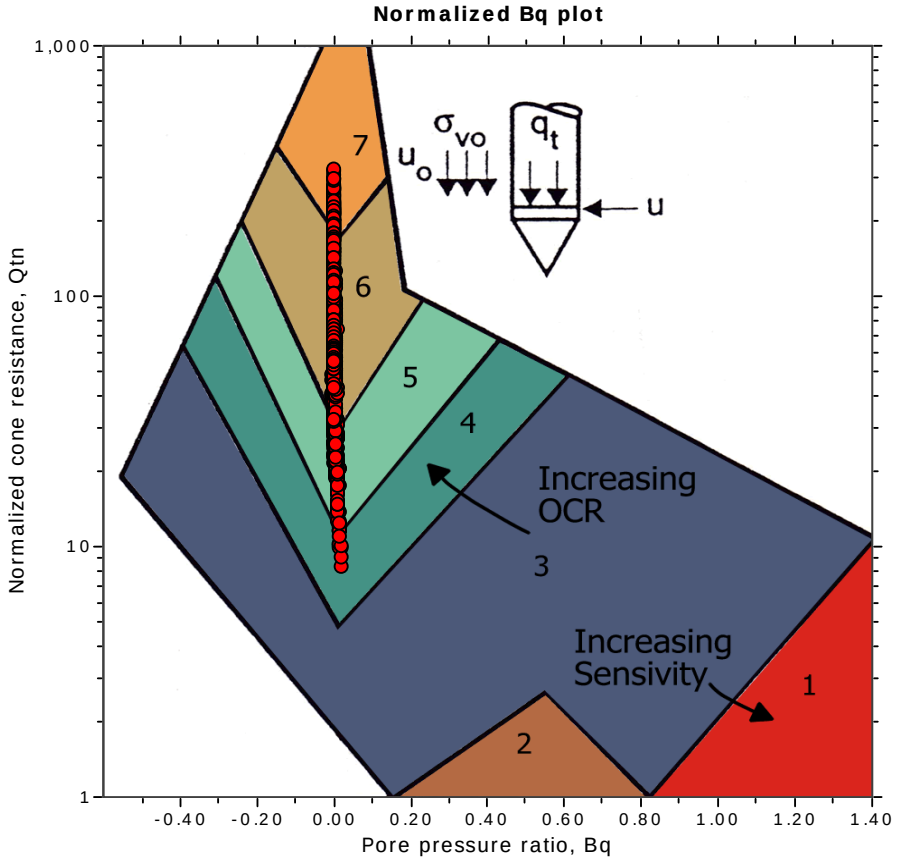
SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

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SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train

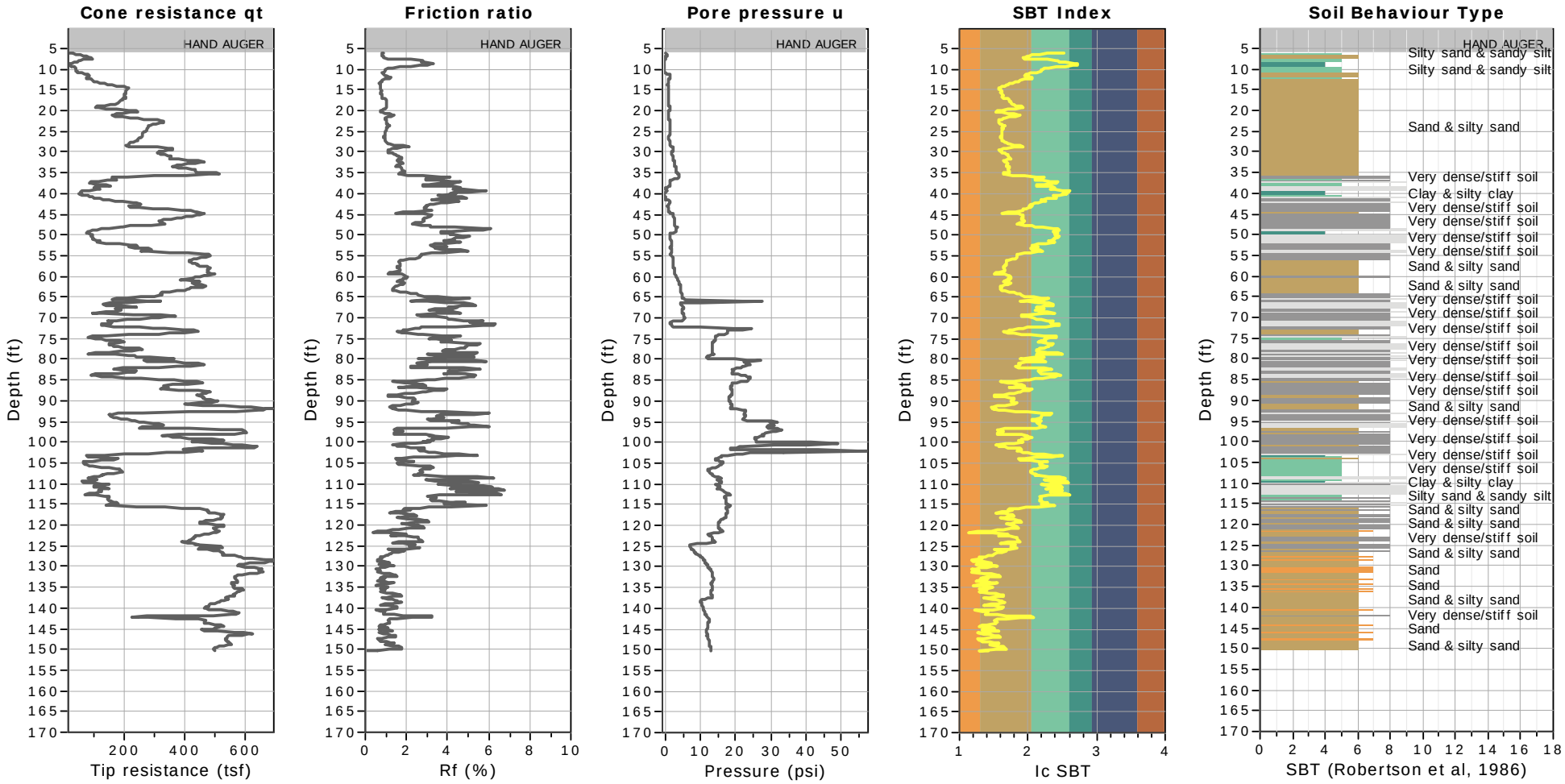
Location: Fresno-Bakersfield

CPT: S0318CPT

Total depth: 150.43 ft

Surface Elevation: 338.67 ft

Coords: X:6201308.61, Y:2352411.30



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

CPT: S0318CPT

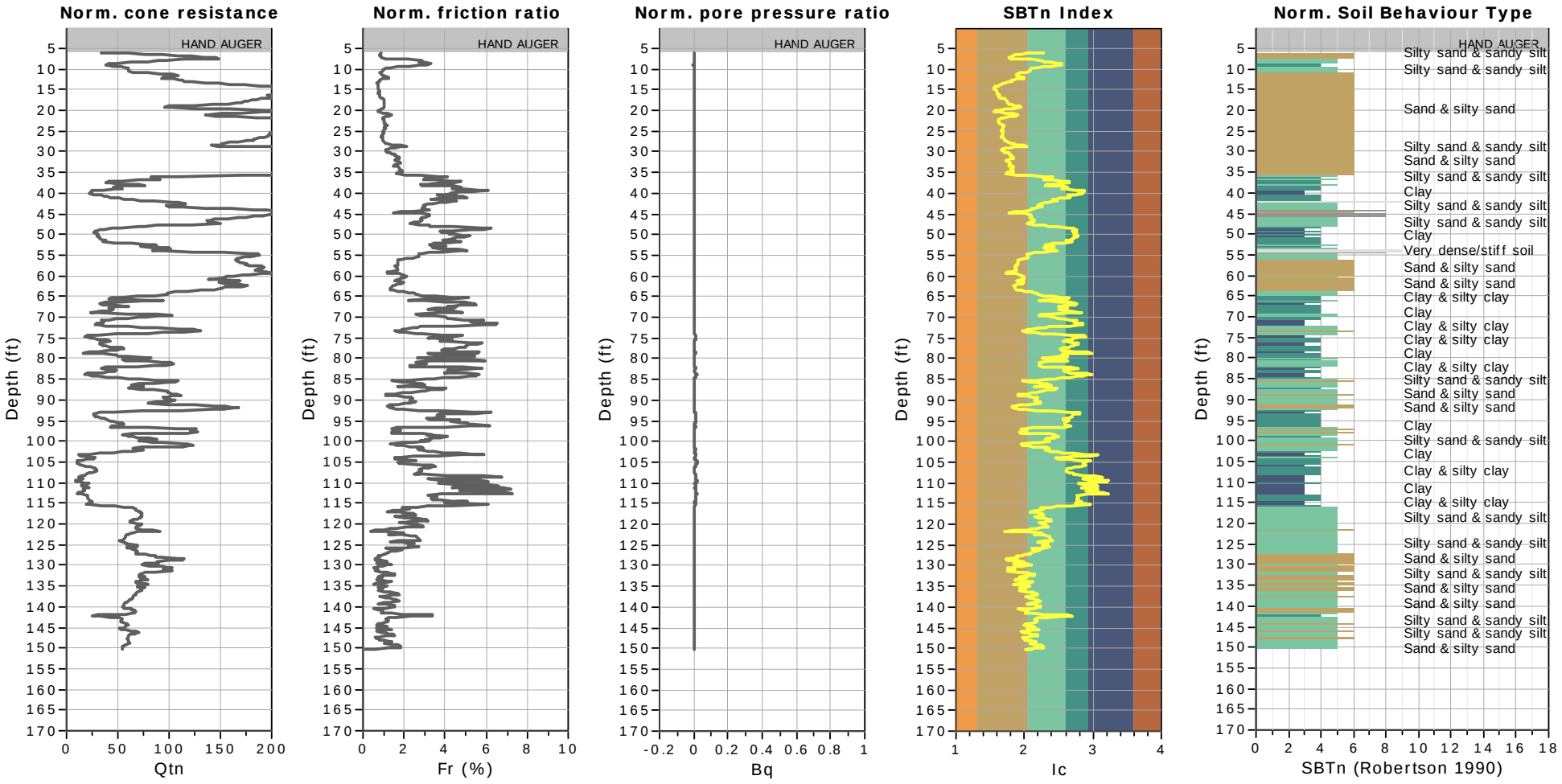
Total depth: 150.43 ft

Surface Elevation: 338.67 ft

Coords: X:6201308.61, Y:2352411.30

Project: California High-Speed Train

Location: Fresno-Bakersfield



SBTn legend

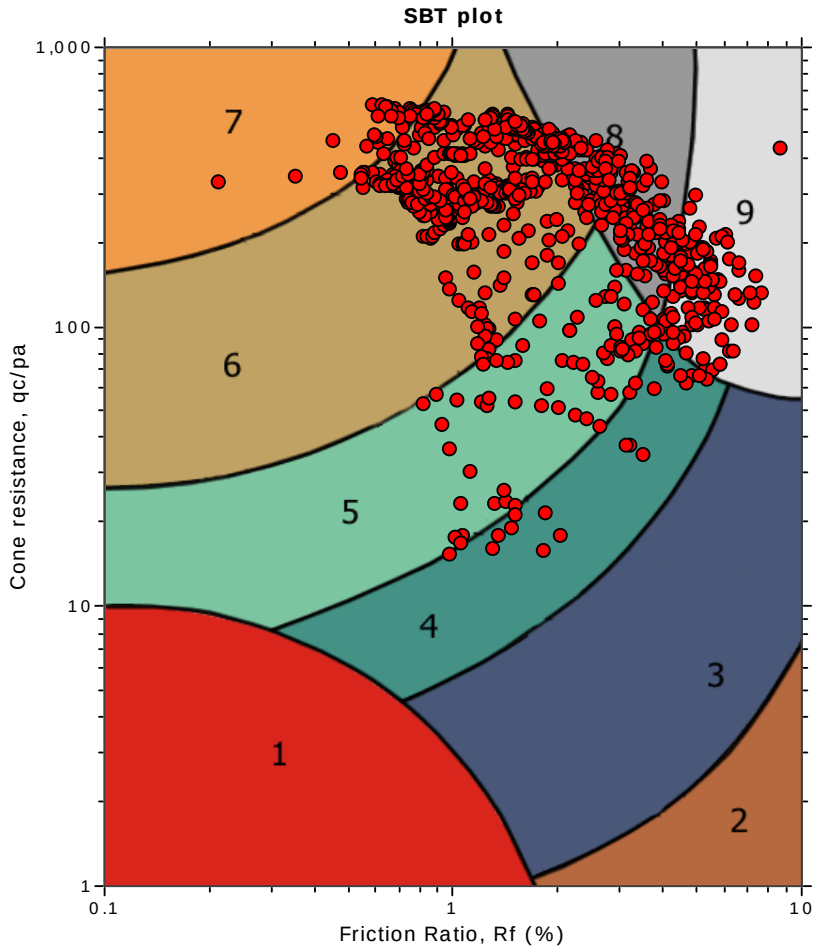
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

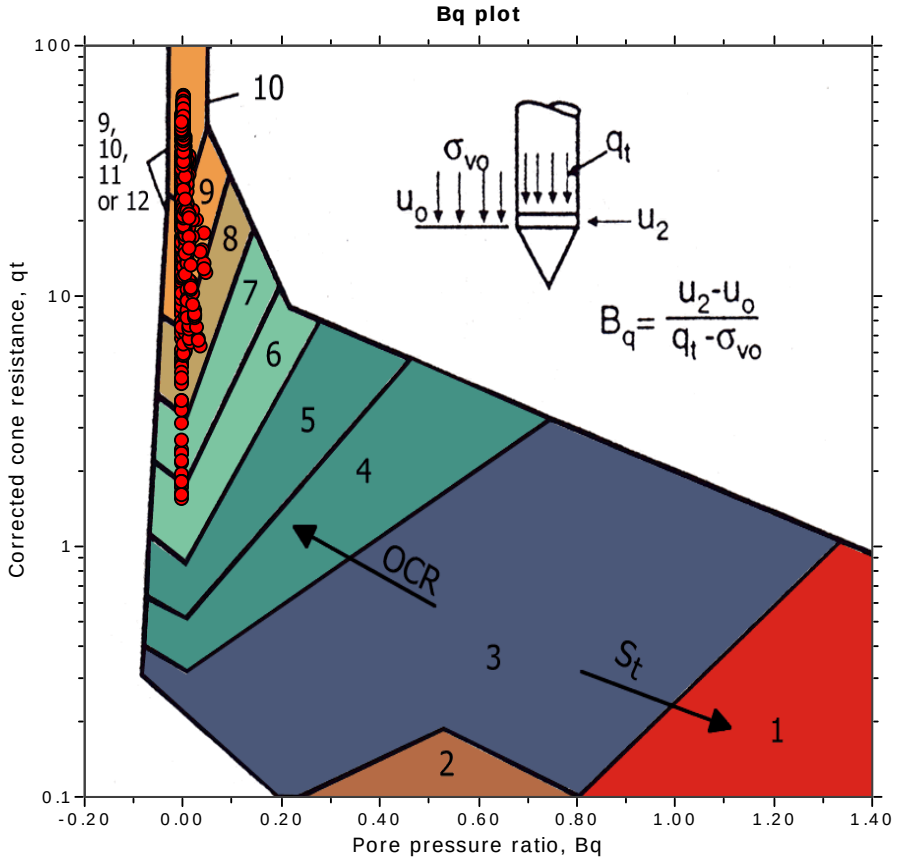
RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

Project: California High-Speed Train
Location: Fresno-Bakersfield

CPT: S0319CPT
Total depth: 150.10 ft
Surface Elevation: 339.71 ft
Coords: X:6202086.34, Y:2351616.74

SBT - Bq plots





SBT legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0319CPT

Total depth: 150.10 ft

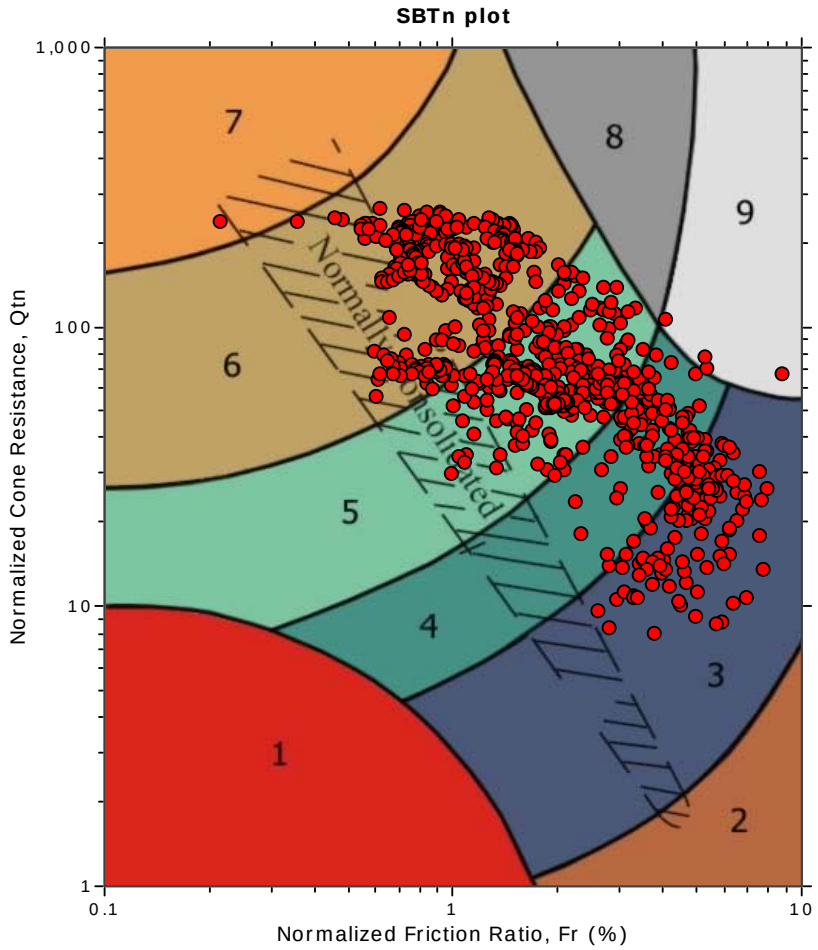
Surface Elevation: 339.71 ft

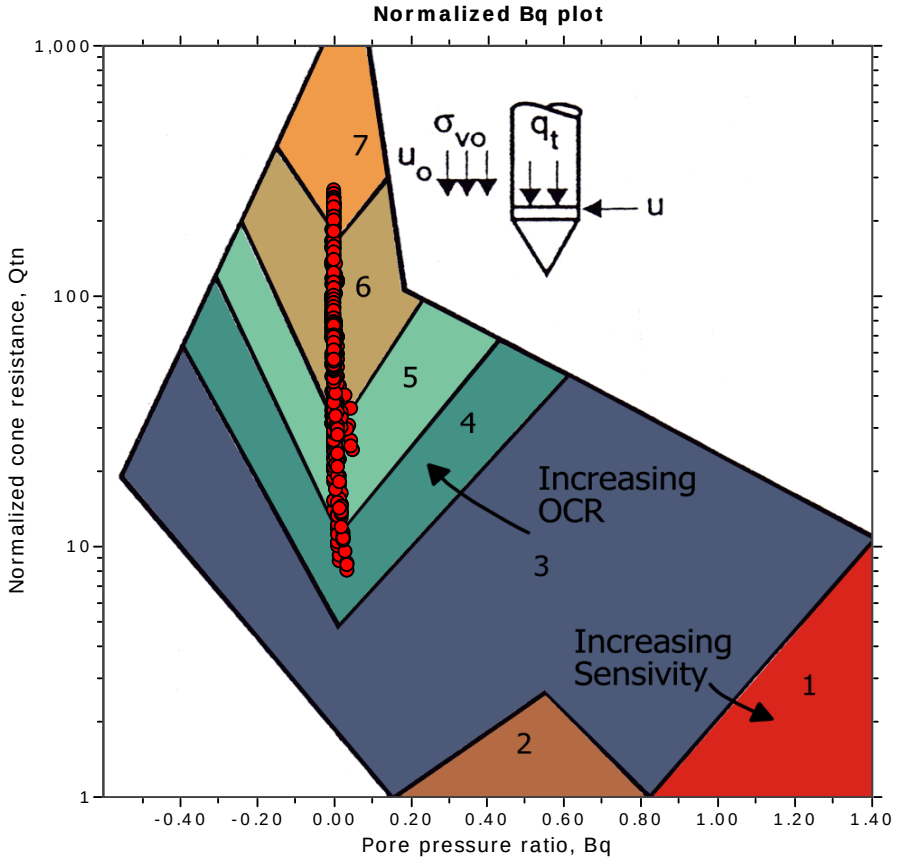
Coords: X:6202086.34, Y:2351616.74

Project: California High-Speed Train

Location: Fresno-Bakersfield

SBT - Bq plots (normalized)





SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

CPT: S0319CPT

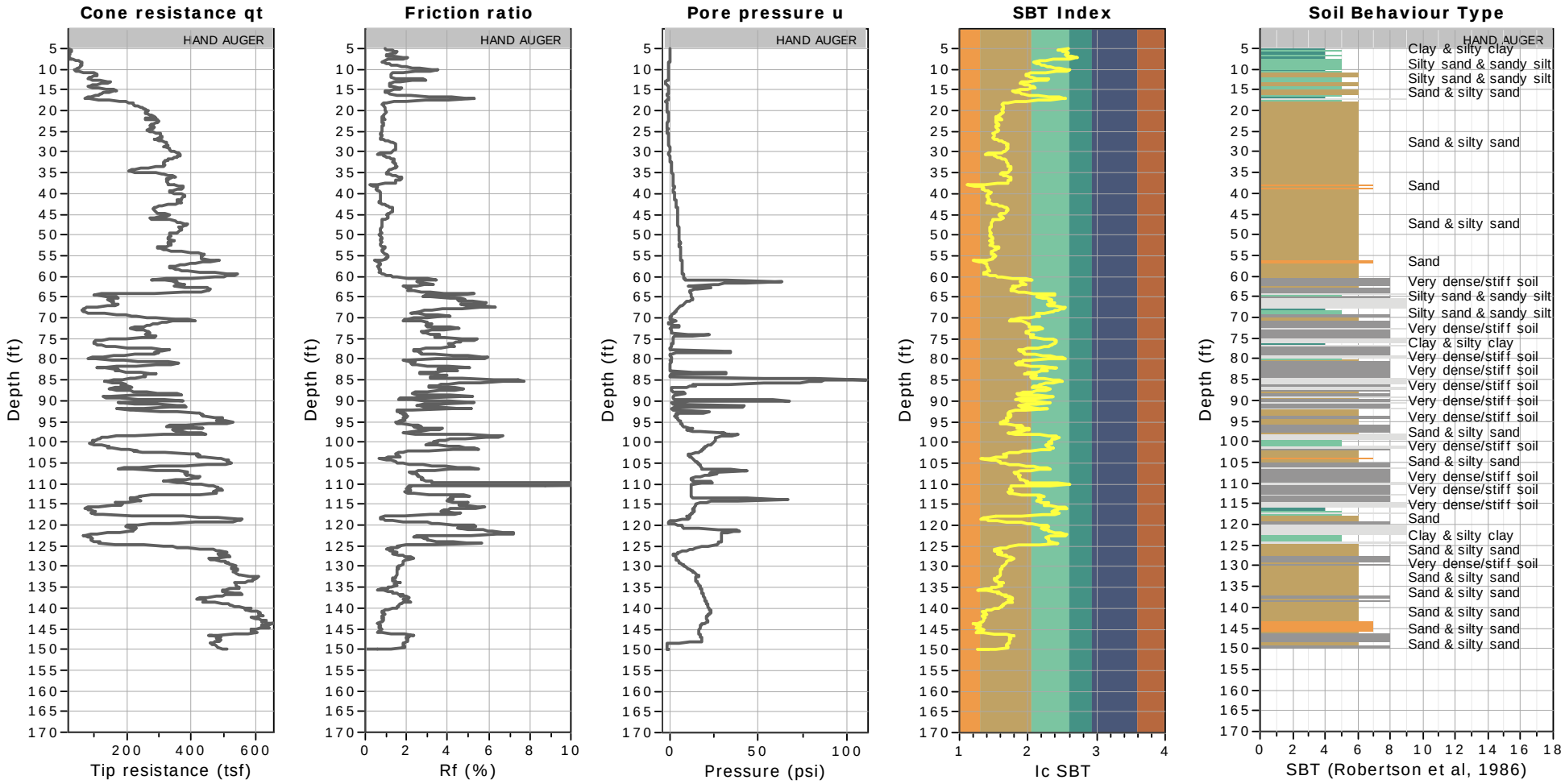
Total depth: 150.10 ft

Surface Elevation: 339.71 ft

Coords: X:6202086.34, Y:2351616.74

Project: California High-Speed Train

Location: Fresno-Bakersfield



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Project: California High-Speed Train

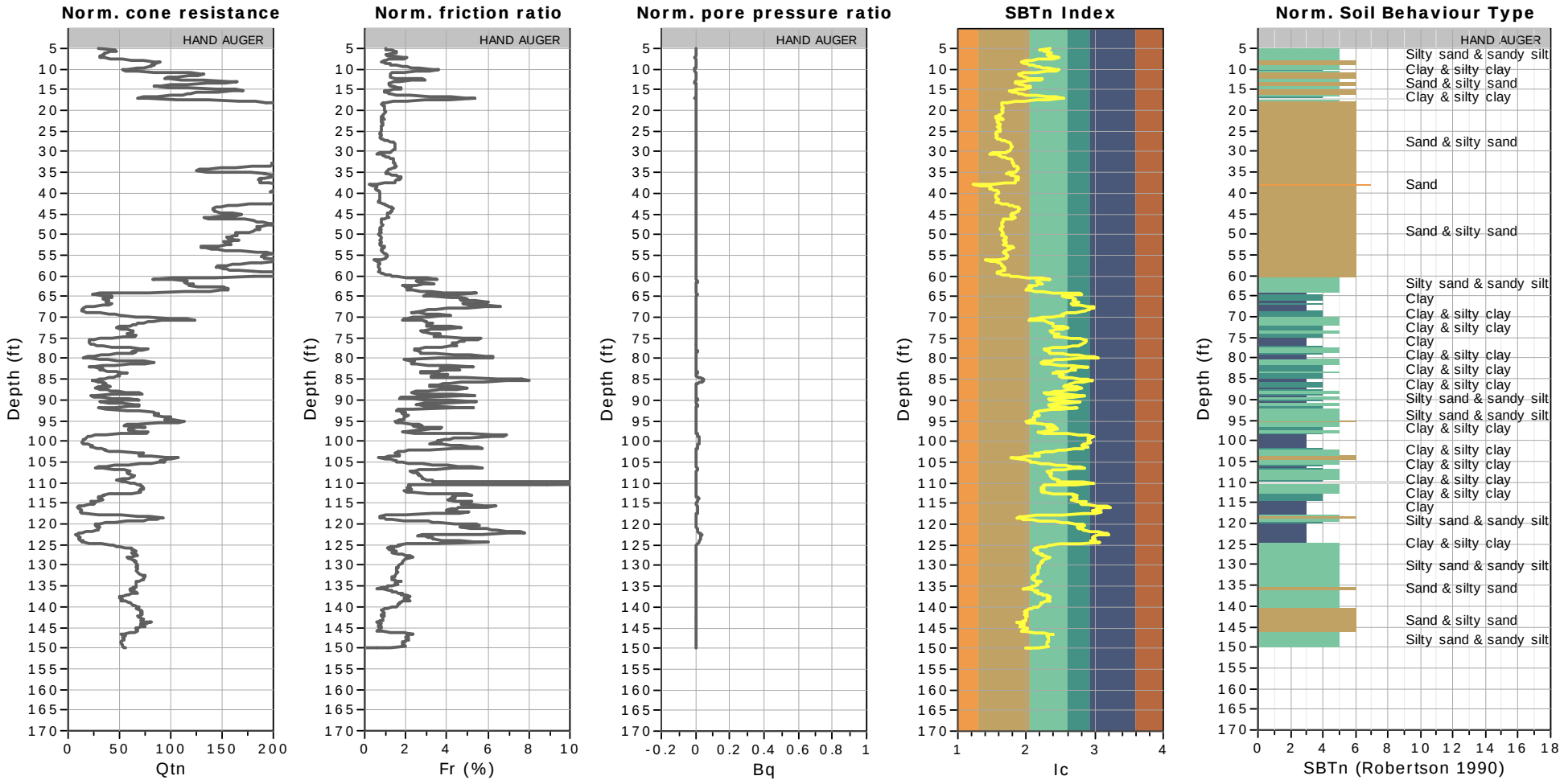
Location: Fresno-Bakersfield

CPT: S0319CPT

Total depth: 150.10 ft

Surface Elevation: 339.71 ft

Coords: X:6202086.34, Y:2351616.74



RFP No. HSR 14-32 – INITIAL RELEASE - 05/27/2015

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

Appendix D

PS Logging Records — GEOVision Geophysical Services

For Report PDF, see CD

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Table D-1

Summary of PS Logging Locations, Depths, and Dates Logged

Borehole ID	Date Logged	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Total Depth of Drilling (ft)	Depth Interval[1]	
						Top Depth (ft)	Bottom Depth (ft)
S0077R	10/4/2013	6,165,385	2,431,686	299.0	165	4.9	153.2
S0082R	11/7/2013	6,165,176	2,407,455	328.3	158	6.6	142.7
S0088R	11/7/2013	6,183,716	2,370,927	344.6	165	6.9	150.9
S0091R	9/24/2013	6,203,198	2,350,323	340.4	165	3.9	150.9

[1] Logging performed at 1.6-foot intervals between top and bottom depths

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Appendix E
Laboratory Test Records

For Lab Data, see CD

Table E-1

Laboratory Index and Chemistry Test Quantities

Test Type	ASTM Standard	No. of Tests
Moisture Test	ASTM D 2216	185
Dry Density	ASTM D2937	127
Atterberg Limit	ASTM D 4318	49
Organics	ASTM D 2974	0
Particle-Size Analysis	ASTM D 422	160
Soils Finer than the No. 200 Sieve	ASTM D 1140	160
Soil Resistivity	ASTM G 57	5
Soil Corrosivity (pH, Chloride, Sulfate)	ASTM D4327	5
Modified Proctor	ASTM D1557	21
California Bearing Ratio	ASTM D1883	7
Groundwater Chemistry (pH, Calcium, $CACO_3$, Specific Conductance, Total Dissolved Solids Sulfate)	SM 4500-H+B, EPA 200.7, SM 2320B, SM 2510B, EPA 300.0	1

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0074R	B-01	0	229.6	SM	8.3				54.4	
S0074R	SS-02	6	223.6	ML/SM	14				50.6	
S0074R	MC-03	11	218.6	SM	14					
S0074R	SS-06	26	203.6	ML					77.7	
S0074R	SS-08	36	193.6	ML	31.6	42.9	28.3	14.6		
S0074R	U-09	37	192.6	CL	27.6	32.3	22.6	9.7		
S0074R	MC-10	40	189.6	CL		30.2	20	10.2	70.7	
S0074R	MC-10	41	188.6	CL	12.8					
S0074R	SS-11	46	183.6	ML					59	
S0074R	MC-12	51	178.6	ML	20.3	28.7	23.1	5.6		
S0074R	SS-13	56	173.6	SC	30.3				47.5	
S0074R	SS-15	66	163.6	ML					57.3	
S0074R	MC-16	70.5	159.1	SM	26.1					
S0075R	B-01	0	257.9	ML/SM	11.5				53.5	
S0075R	MC-02	5.5	252.4	ML						
S0075R	MC-02	6	251.9	ML	18.2				64.1	
S0075R	MC-04	15.5	242.4	SM	10.9					
S0075R	SS-05	21	236.9	SP-SM	2.2				10.7	
S0075R	MC-06	26	231.9	ML	23.6					
S0075R	SS-07	31	226.9	ML	23.8				68.8	
S0075R	MC-09	35	222.9	SM	8.9				21.8	

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0075R	SS-10	41	216.9	ML	19.3				65.4	
S0075R	MC-11	46	211.9	SM	10				21.8	
S0075R	SS-14	61	196.9	ML/SM	20.5				52.4	
S0075R	SS-16	71	186.9	ML	24.7				69.3	
S0076R	B-01	0	269.7	SM						
S0076R	MC-02	6	263.7	SM	9					
S0076R	SS-03	10	259.7	SP-SM					9	
S0076R	MC-06	26	243.7	ML	22.3					
S0076R	SS-07	30	239.7	SM					21	
S0076R	MC-08	36	233.7	SM	8.2					
S0076R	MC-10	45.5	224.2	CL		34	14	20		
S0076R	MC-10	46	223.7	CL	20.7					
S0076R	SS-11	51	218.7	SC					26	
S0076R	MC-16	76	193.7	SP-SM	8.5				11	
S0076R	MC-18	85.5	184.2	SM					42	
S0076R	MC-20	95.5	174.2	SM					44	
S0077R	B-01	0	299.0	ML					60	
S0077R	MC-02	5.5	293.5	CL					72	
S0077R	MC-02	6	293.0	ML	14.8				63	
S0077R	MC-04	16	283.0	SP	3.9					
S0077R	SS-05	21	278.0	CL/SC					55	
S0077R	MC-06	25.5	273.5	CL	28.2	48	17	31		
S0077R	MC-06	26	273.0	CL	33.4					
S0077R	MC-08	35.5	263.5	SM					29	

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0077R	SS-09	41	258.0	ML					66	
S0077R	MC-10	45.5	253.5	CL	21.6	35	17	18	64	
S0077R	SS-11	51	248.0	ML					65	
S0077R	MC-12	55.5	243.5	SM					35	
S0077R	MC-12	56	243.0	SM	13.2					
S0077R	SS-13	61	238.0	SP-SM	6.1				13	
S0077R	SS-15	71	228.0	SP-SM					18	
S0077R	MC-16	75.5	223.5	SP-SM	8.4					
S0077R	SS-17	81	218.0	CL		40	18	22		
S0077R	U-18	82	217.0	CL	19.7	37	16	21	59	
S0077R	MC-19	85.5	213.5	ML	22.1					
S0077R	SS-23	101	198.0	ML/SM	21.3				53	
S0077R	MC-24	106	193.0	ML	16.6					
S0077R	SS-25	111	188.0	CL					59	
S0077R	MC-26	116	183.0	CL	16.1					
S0077R	MC-28	125.5	173.5	CL	23.3	35	14	21		
S0077R	MC-28	126	173.0	CL	16.4					
S0077R	SS-29	131	168.0	CL	16.3	30	15	15		
S0078R	B-01	0	306.0	SC						
S0078R	SS-02	6	300.0	SM/ML					45	
S0078R	MC-03	11	295.0	SP	6.1					
S0078R	SS-06	26	280.0	SM					29	
S0078R	MC-11	51	255.0	SM	20.9					
S0078R	SS-12	56	250.0	ML					71	

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0078R	MC-13	60.5	245.5	ML					79	
S0078R	MC-13	61	245.0	SM	12.8				34	
S0078R	SS-14	66	240.0	SM					62	
S0078R	MC-15	73	233.0	ML	24.91					
S0078R	SS-16	76	230.0	ML/SM					52	
S0078R	SS-18	86	220.0	SM					66	
S0078R	SS-20	96	210.0	CL	17.4	34	13	21		
S0078R	MC-21	100.5	205.5	SM	10.3				26	
S0078R	SS-22	106	200.0	SC	17.9	35	13	22		
S0078R	SS-24	116	190.0	SM					38	
S0078R	MC-27	130.5	175.5	SM	16.2				35	
S0079R	B-01	0	304.6	ML					63	
S0079R	MC-02	6	298.6	ML/SM	14				50	
S0079R	SS-03	11	293.6	ML/SM					55	
S0079R	MC-04	16	288.6	ML/SM	10.69					
S0079R	SS-05	21	283.6	ML/SM					52	
S0079R	SS-07	31	273.6	ML					74	
S0079R	SS-09	41	263.6	SM					19	
S0079R	MC-10	46	258.6	SM	15.7					
S0079R	SS-11	51	253.6	CL	13.4	24	14	10		
S0079R	SS-13	61	243.6	SM					14	
S0079R	MC-14	67.5	237.1	CL	17.2	29	18	11		
S0079R	MC-14	68	236.6	CL	19.08					
S0079R	SS-17	81	223.6	ML/SM					50	

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0080R	B-01	0	312.3	SM						
S0080R	SS-02	5	307.3	CL		26.5	19.3	7.2		
S0080R	MC-03	11	301.3	SM	8.8					
S0080R	SS-04	15	297.3	ML/SM	14.5				50.5	
S0080R	MC-05	21	291.3	SP	5.1					
S0080R	SS-06	26	286.3	SP-SM	11.6				6.8	
S0080R	MC-09	40.5	271.8	ML					62.3	
S0080R	SS-10	45	267.3	ML	19.8				64.5	
S0080R	MC-11	51	261.3	ML	19.5					
S0080R	SS-12	55	257.3	SM	14.8				40.5	
S0080R	MC-13	61	251.3	SP	9.9					
S0080R	SS-16	75	237.3	ML/SM					54.9	
S0080R	MC-17	81	231.3	ML/SM	20.1					
S0081R	B-01	0	320.7	SM			NP			
S0081R	SS-02	5	315.7	SM	10				40.6	
S0081R	MC-03	11	309.7	SM	14.9					
S0081R	SS-04	15	305.7	ML/SM					52.7	
S0081R	MC-05	21	299.7	SM	13.2					
S0081R	SS-10	46	274.7	SP-SM	10				12.7	
S0081R	MC-11	50.5	270.2	ML		25.1	21.7	3.4		
S0081R	MC-11	51	269.7	ML	21.7					
S0081R	MC-13	60.5	260.2	SP-SM	8				5.7	
S0081R	MC-15	70.5	250.2	ML					67.5	
S0081R	MC-15	71	249.7	ML	22.2					

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0081R	SS-16	76	244.7	SM/ML	14.4				48.3	
S0082R	B-01	0	328.3	SM	10.3				36.9	
S0082R	SS-02	6	322.3	SM	11.5				43.3	
S0082R	SS-04	16	312.3	SP-SM	7.6				10	
S0082R	MC-05	21	307.3	SM	12.8					
S0082R	SS-06	26	302.3	SM/ML	15.5				46.7	
S0082R	MC-07	31	297.3	SM	10.1					
S0082R	SS-10	46	282.3	CL		30.6	18	12.6		
S0082R	MC-11	51	277.3	CL	15.6					
S0082R	MC-13	61	267.3	ML	16.2					
S0082R	SS-16	76	252.3	ML		30.3	23.5	6.8	55.2	
S0082R	MC-21	101	227.3	SM	14					
S0083R	B-01	0	331.9	SM						
S0083R	SS-02	6	325.9	SM	10.4				36.9	
S0083R	MC-03	11	320.9	SM	8					
S0083R	MC-05	20.5	311.4	SW-SM	12.7				6.6	
S0083R	SS-06	26	305.9	CL-ML/SM	11.2	24.3	19.2	5.1	51.6	
S0083R	MC-07	31	300.9	SP-SM	6.5					
S0083R	SS-08	36	295.9	SC					35.5	
S0083R	MC-11	51	280.9	CL	15.5					
S0083R	MC-17	81	250.9	SM	13.9					
S0083R	SS-18	86	245.9	SM	10.7				39.6	
S0083R	MC-21	100.5	231.4	SP-SM	11.9					
S0083R	MC-23	111	220.9	CL-ML	17.2					

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0084AR	B-01	0	337.1	#N/A						
S0084AR	SS-02	6	331.1	SM					44	
S0084AR	MC-03	10.5	326.6	SM					23	
S0084AR	MC-03	11	326.1	SM	34.7					
S0084AR	SS-04	16	321.1	SW-SM					10	
S0084AR	SS-06	26	311.1	SM					16	
S0084AR	MC-07	31	306.1	SM	11.3					
S0084AR	SS-08	36	301.1	SM					44	
S0084AR	SS-10	46	291.1	ML					57	
S0084AR	MC-12	55.5	281.6	CL	24.1	37	16	21		
S0084AR	SS-14	66	271.1	ML					75	
S0084AR	MC-15	71	266.1	SP-SM	11.8					
S0084AR	SS-18	86	251.1	CL	14.9	31	14	17		
S0084AR	MC-21	101	236.1	SM	13.4					
S0084AR	SS-22	106	231.1	ML					68	
S0084R	B-01	0	345.0	#N/A						
S0084R	SS-02	6	339.0	SM	2.8				17.4	
S0084R	MC-03	11	334.0	SW-SM	4.1				6	
S0084R	SS-04	16	329.0	CL					77.7	
S0084R	MC-05	21	324.0	SM	7.8					
S0084R	MC-07	31	314.0	SP-SM	9.7					
S0084R	SS-08	36	309.0	SC-CL	11.4				48	
S0084R	MC-09	41	304.0	ML	15					
S0084R	MC-11	51	294.0	CL-ML	20.6	36	14	22		

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0084R	MC-13	61	284.0	SM	10.3					
S0084R	SS-14	66	279.0	SM	7.3				26.2	
S0084R	MC-15	70.5	274.5	SP-SM	10.1					
S0084R	MC-17	80.75	264.2	SM	9.3				22.5	
S0084R	SS-20	95.5	249.5	SM	13.1				17.6	
S0084R	MC-23	110.5	234.5	SM	8.9					
S0085R	B-01	0	344.7	SM						
S0085R	MC-02	6	338.7	SM	9					
S0085R	SS-03	11	333.7	SP	13.9				3.5	
S0085R	MC-04	16	328.7	SP-SM	7.7					
S0085R	SS-05	21	323.7	CL-ML	14.2				70.1	
S0085R	SS-07	31	313.7	CL	14.2	44.2	23.9	20.3		
S0085R	MC-14	66	278.7	CL	16.7					
S0085R	MC-16	76	268.7	SC	12.4	28	18.9	9.1	40.6	
S0085R	MC-18	86	258.7	SC	12.1					
S0086R	B-01	0	344.6	SM						
S0086R	SS-02	6	338.6	SM	8.6				40.9	
S0086R	MC-03	11	333.6	CL-ML/SM	18.4	28.3	21.8	6.5	45.7	
S0086R	SS-04	16	328.6	CL-ML	18.7	25.7	19.2	6.5		
S0086R	MC-05	21	323.6	SM	9.8				19.6	
S0086R	SS-06	26	318.6	ML	18.4	27.2	22.4	4.8	54.3	
S0086R	MC-07	30.5	314.1	SM	14.6				16	
S0086R	MC-09	40.5	304.1	SM	8.7				15.4	
S0086R	SS-10	46	298.6	SM/ML					46	

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0086R	SS-12	56	288.6	ML/SM	15.8				52	
S0086R	MC-13	60.5	284.1	CL	10.6	29.8	21.4	8.4	65.6	
S0086R	MC-13	61	283.6	CL	10.6					
S0086R	MC-15	70.5	274.1	SM	9.2				15.7	
S0086R	SS-16	76	268.6	CL		31.7	21.9	9.8		
S0086R	SS-20	96	248.6	ML		32.1	24.2	7.9		
S0087R	B-01	0	341.8	SM						
S0087R	MC-03	11	330.8	SM	9.8					
S0087R	MC-06	20.5	321.3	SM	11.6				39.8	
S0087R	MC-06	21	320.8	SM	11.6					
S0087R	SS-07	26	315.8	CL-ML		24	17.8	6.2		
S0087R	MC-08	31	310.8	ML	30.3					
S0087R	SS-09	36	305.8	ML	18.8				72.8	
S0087R	MC-10	41	300.8	SM	7.5					
S0087R	MC-16	71	270.8	SC						
S0087R	SS-17	76	265.8	ML	14.4				56.6	
S0088AR	B-01	0	337.4	SM						
S0088AR	MC-03	11	326.4	SP	4.6					
S0088AR	SS-04	16	321.4	CL		33	14	19		
S0088AR	MC-05	21	316.4	SM	6.7					
S0088AR	SS-06	26	311.4	SM					31	
S0088AR	MC-07	31	306.4	SP	10.9					
S0088AR	SS-08	36	301.4	ML					76	
S0088AR	MC-09	41	296.4	SM	9.4					

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0088AR	MC-11	51	286.4	CL-ML	10.9	20	14	6		
S0088AR	MC-15	71	266.4	CL	16.7	30	19	11		
S0088AR	SS-16	76	261.4	ML					68	
S0088AR	SS-20	96	241.4	ML					95	
S0088AR	SS-22	106	231.4	ML					74	
S0088AR	MC-23	110.9	226.5	CL	16					
S0088AR	SS-26	126	211.4	CL		26	15	11	58	
S0088R	B-01	0	346.1	#N/A	9.9				37.3	
S0088R	SS-02	6	340.1	SM/ML					49.1	
S0088R	MC-03	11	335.1	CH	13.3					
S0088R	SS-04	16	330.1	ML					64	
S0088R	U-05	17	329.1	CL-ML	32.8				67.1	
S0088R	U-05	17.8	328.3	CL-ML		28.2	22.1	6.1		
S0088R	U-05	18	328.1	CL-ML	21.8					
S0088R	MC-05	21	325.1	CL	16.8					
S0088R	SS-06	26	320.1	SM/ML					46	
S0088R	MC-07	31	315.1	SM	10.2					
S0088R	MC-11	51	295.1	SM	14					
S0088R	MC-16	71	275.1	ML	19.3					
S0088R	MC-18	81	265.1	SM	12.5				33	
S0088R	U-21	93	253.1	CL	16.1	33	18	15		
S0089R	B-01	0	332.8	SM	4.9				21.7	
S0089R	SS-3	11	321.8	ML	16.5				74.4	
S0089R	MC-4	16	316.8	ML	14.5					

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0089R	MC-6	26	306.8	ML	13.4					
S0089R	SS-7	31	301.8	SP-SM	3.3				11.7	
S0089R	SS-11	51	281.8	ML		19.2	18.3	0.9		
S0089R	MC-12	56	276.8	SM	9.5				35.3	
S0089R	MC-14	66	266.8	CL-ML	15.4	24.3	20.3	4	57.5	
S0089R	SS-15	71	261.8	CL	20.6				75.5	
S0089R	MC-16	76	256.8	SM	10.3				24	
S0089R	SS-17	80.5	252.3	SM	24.5				91.1	
S0090R	B-01	0	340.4	SM					36	
S0090R	MC-03	11	329.4	SM	8.3					
S0090R	SS-04	16	324.4	SM					28	
S0090R	SS-06	26	314.4	SP-SM					9	
S0090R	MC-09	41	299.4	CL	21.9	29	16	13		
S0090R	SS-12	56	284.4	ML					61	
S0090R	MC-19	90.5	249.9	CL	16.8	34	14	20		
S0090R	SS-20	96	244.4	CL/SC					54	
S0090R	MC-23	110.5	229.9	ML	24.4				90	
S0090R	MC-23	111	229.4	ML	22.9					
S0090R	SS-24	115.8	224.6	ML					84	
S0090R	MC-25	120.5	219.9	SP	9.8					
S0090R	SS-26	125.9	214.5	SM					16	
S0090R	SS-28	136	204.4	SP					72	
S0091R	B-01	0	346.6	SM					48	
S0091R	SS-02	6	340.6	SC	8.4					

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Table E-2

Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth (ft)	Elevation (NAVD88) (ft)	USCS Group	Moisture Content, W_o (%)	Liquid Limt w_l (%)	Plastic Limit w_p (%)	Plasticity index I_p (%)	Percent Fines (%)	Organic Content (%)
S0091R	MC-03	11	335.6	SM	8.3					
S0091R	SS-04	16	330.6	SM					10	
S0091R	MC-O5	20.5	326.1	SM	8.6				28	
S0091R	SS-06	26	320.6	SP-SM	6.8					
S0091R	MC-07	31	315.6	SP	21.4					
S0091R	SS-08	36	310.6	CL					91	
S0091R	MC-09	40.5	306.1	SM	7.6				5	
S0091R	MC-11	51	295.6	SP	7.2				11	
S0091R	SS-14	66	280.6	SC					51	
S0091R	MC-17	80.5	266.1	SP					10	
S0091R	MC-19	90.9	255.7	CL	12.4					
S0091R	SS-20	95.9	250.7	CL/SC					43	
S0091R	MC-21	100.8	245.8	SW	11.52					
S0091R	MC-23	110.3	236.3	ML	8.8				9	
S0091R	MC-25	120.3	226.3	SP	9.8				9	

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Table E-3

Summary of Modified Proctor Results

Test	Test Reference	No. of Tests	Range of Values [1]	Mean Value	Standard Deviation
Maximum Dry Unit Weight	ASTM D 1557	21	115.3 to 133.4	127	4
Optimum Moisture Content		21	6.5 to 14.3	9	2

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Table E-4

Summary of California Bearing Ratio Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
California Bearing Ratio	ASTM D 1883	7	6 to 55	21	17

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Attachment
Geotechnical Data Report (GDR)
Piezometer Update-Memo

URS/HMM/Arup Joint Venture
2870 Gateway Oaks Drive, Suite 150
Sacramento, CA 95833
Tel: (916) 679-2000
Fax: (916) 679-2900

MEMORANDUM

To:	California High-Speed Rail Authority Project File
From:	Martin Walker, Geotechnical Engineer for JV
Copy:	
Date:	October 24, 2014
Subject:	Construction Package 4 Geotechnical Data Report Update: Piezometer Memo

As part of the ground investigation (GI) for Construction Package 4 (CP-4), four standpipe piezometers were installed in select boreholes for purposes of assessing the depth to groundwater. The results of this monitoring were presented in the Record Set Fresno to Bakersfield Sierra Subdivision CP-4 Geotechnical Data Report (GDR) dated May 2014. This memorandum provides data collected up to October 16, 2014. Where data are presented, the same table and figure numbering has been retained for consistency.

Installation details for the piezometers are presented in Table 5.5-1. This table is unchanged from the GDR, but has been presented for completeness. For more information regarding the piezometers, including installation records and boreholes logs, refer to the GDR.

Manual readings of groundwater depth were taken on October 16, 2014, have been added to Table 5.5-2.

DataLoggers were installed during the GI to record hourly measurements indicating groundwater level. Data from these DataLoggers was downloaded at the time of the manual readings. The DataLogger results and manual readings are presented in Figure 5.5-2.

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Table 5.5-1
Standpipe Piezometer Installation Details

Piezometer ID	Date Installed	Northing, NAD83 (ft)	Easting, NAD83 (ft)	Elevation, NAVD88 (ft)	Well Screen Depth[a]		Sand Filter[b]	
					Top Depth (ft)	Bottom Depth (ft)	Top Depth (ft)	Bottom Depth (ft)
S0077R	11/11/1943	2,431,686	6,165,385	299.0	45	65	42	73
S0078R	11/11/2013	2,430,151	6,166,302	306.0	90	120	84	125
S0083R	11/11/2013	2,402,676	6,165,442	331.9	96	126	90	151.5
S0088AR	11/11/2013	2,365,234	6,188,715	346.1	120	150	115	151

[a] 2-inch-outer-diameter Schedule 40 PVC with 0.020-inch slotted screen.
[b] No. 3 Monterey sand.

Table 5.5-2
Groundwater Levels Measured in Standpipe Piezometers

Piezometer ID	S0077R[a]	S0078R	S0083R[b]	S0088AR[c]
Top of Well Box Elevation, NAVD88 (ft)	299.0	306.0	331.9	346.1
Date Read	**Measured Depth Groundwater (ft)**			
11/7/2013[d]	ND[e]	ND	ND	146.6
11/8/2013[d]	ND	dry	116	ND
1/11/2013	70.1	99.94	125.2	143.3
1/6/2014	70.1	ND	dry	dry
2/19/2014	ND	101.8	124.8	dry
4/16/2014	dry	ND	125.1	dry
10/16/2014	70.4	106	126.1	147.7

[a] S0077R – likely dry; water tagged at 70.1 ft is likely trapped in silt trap and likely does not represent GW conditions. Datalogger is set at 60 ft and is currently dry.
[b] S0083R – GW may be present below the datalogger, which is set at 120 ft bgs and is currently dry.
[c] S0088AR – GW may be present below the datalogger, which is at a depth of 140 ft bgs and is currently dry.
[d] Measured prior to well development.
[e] ND signifies no data acquired from that location on that date.

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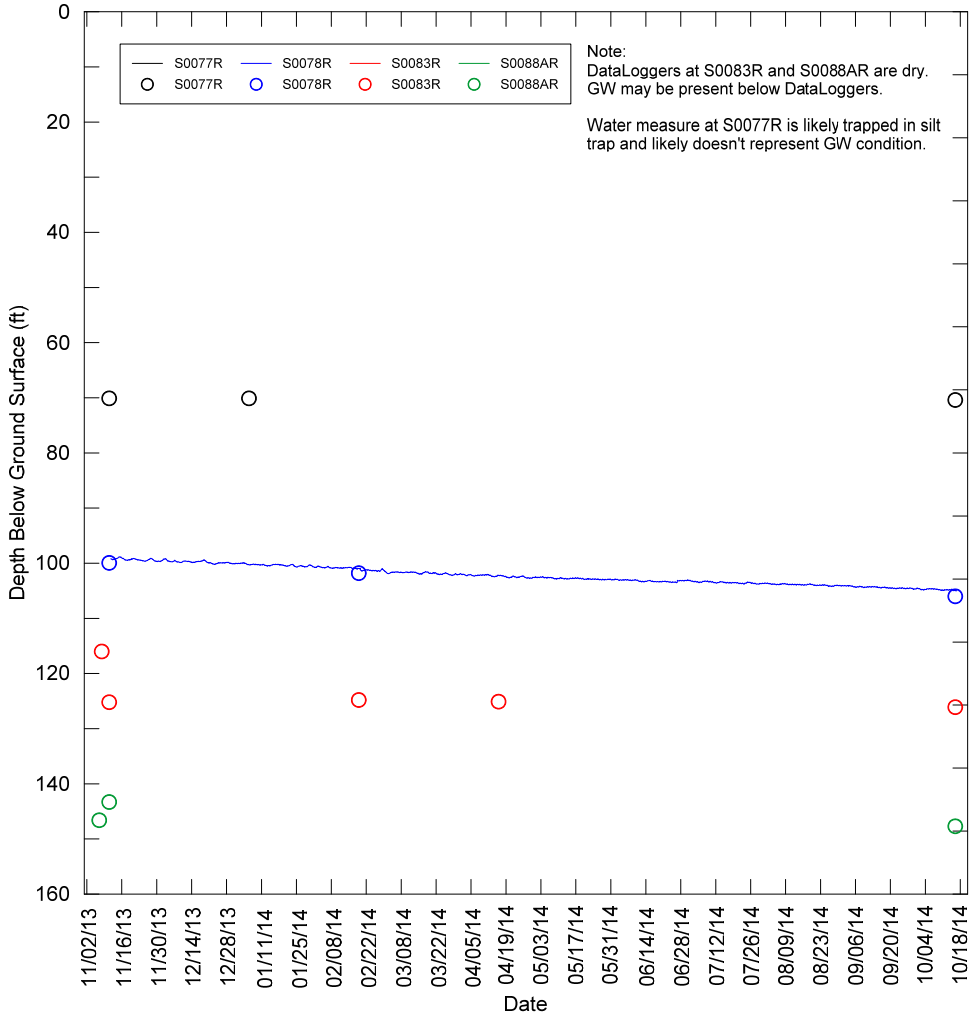


Figure 5.5-1
Groundwater Depths Measured in Standpipe Piezometers

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